THE AMERICAN GAS LIGHT JOURNAL

REDMANKENNY.N.Y.

PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME LXII.—No. 20. Whole No. 1,041. | NEW YORK, MONDAY, MAY 20, 1895. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor. T. J. CUNNINGHAM, Asst. Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

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[Special Editorial Correspondence.]

CHRONICLES ANENT THE WESTERN ASSOCIATION'S PITTSBURGH MEETING.

PITTSBURGH, PA., Wednesday, May 15, 1895.

Dear JOURNAL: The Monongahela House at the time of writing is certainly a humming hive, and no matter where one looks or where he turns he is sure to see group after group of the gas men of America. It is true, it is according to the cards a meeting of the Western Gas Association, nor can the fact be successfully denied that the West is here in force; but so are the East, the North and the South—just as it should be. Another thing that is as it should be is the fact that all seem cheerful and chipper, because *all* are reporting marked increases in sendout as between this year and last. I will not attempt to mention names as evidence that "the people" are here, for if I did I would take up about all the space in the JOURNAL that is at my present command. Still I'll not be in error if I mention one who is not present, and who some months ago confidently counted on being able to help his associates on the Committee of Arrangements in the pleasant task of welcoming the visitors to Pittsburgh—the absentee is J. Gardner, Jr., who is so ill that he cannot leave his house. That he has everybody's wish for his speedy and complete recovery goes without saying. The weather conditions were mixed, but not unpleasant; but if anything else were needed to complete the existing harmonious feeling it was speedily furnished by the smiling countenance of Mr. Bernard McKenna (to Pittsburghers he is known as "our only Barney"), the Mayor of the Smoky City, as he stood by President Baxter, welcoming the delegates and their guests, and extending to them "the freedom of the city." Hardly had Mr. Evans' reply on behalf of the Association been spoken ere the routine business was underway, and then came President Baxter's address, which more than bore out the augury the JOURNAL made about it some weeks ago. I will not attempt to pass upon its merits here (especially as I presume the text[1] of it will appear in your current issue), save to say that it carries the marks of careful study and much preparation. What struck me most forcibly in it was the reference to the possibilities of the gas coke manufacturing districts as gas producers instead of gas wasters. The first paper to engage the attention of the Association was that by Mr. S. M. Highlands, of Clinton, Ia., who wrote on the matter of "Incandescent Gas Lighting." He treated his theme in rather an unexpected manner, and in a way that provoked a pretty sharp discussion; but the man from Clinton took it all as a matter of course, and never flinched from his guns. Apart from any of his references to the Welsbach burner, and to the policy of those who control its sale in this country, I am of the opinion that Mr. Highlands is a trifle too enthusiastic over the idea that there is "a fair margin of profit" in the business of electric lighting, when such business is handled by gas companies. It is true that 248 gas companies (some of them large ones) in the Central and Western States are operating electric lighting plants, and you have good reason for believing that that number would be very much diminished could the gas men who operate such plants come out whole of that investment by turning them over to some one else for independent operation. Perhaps in the smaller places joint operation may act as an insurance against opposition, but that is all. And in my belief it will be many a day before the name of the Western Gas Association is changed to that of the Western Gas and Electrical Association. Mr. Highlands' paper concluded the morning session; and the afternoon of the first day (as far as the paper list was concerned) was first marked by the reading of Mr. Alten S. Miller's paper on "Metal Tanks for Gas Holders." It was a scholarly production, as was to be expected, and the author made out a good case (in theory, at least), for those who favor this sort of construction. Mr. Geo. H. Harper, of Altoona, Pa., followed with his argument in favor of "The Advantage of the Metric System for All Calculations," and then came the paper by Mr. F. L. Slocum, of Pittsburgh, Pa., on "Acetylene." Mr. Slocum illustrated his remarks with some practical experiments; and many wondered how it was that Mr. Slocum, who, as the man in charge of the gas appliance exhibit and as an exceedingly active member of the local committee of arrangements, appeared almost ubiquitous, could do as well as he did with the apparatus at his command. Mr. Jas. T. Lynn next related "Some Experiences With Foul Gas in a Holder," and he told his story well. The hour for adjournment having arrived, many took advantage of the hour or so before dinner to look over the gas appliance exhibition,

1. See JOURNAL, p. 729.

which had been arranged in three rooms on the ground floor of the Conestoga Building. Although the display was rather on the small side, reckoning from the individual or single concerns represented, nevertheless the whole thing was highly creditable, both to the exhibitors and to those who arranged it. There is no blinking the fact that the Welsbach folks have taken every advantage of this meeting to advertise Dr. Auer's hood, for go where you will, in the session's hall, the dining room of the Monongahela, or almost any other place, the Welsbach is bold in evidence.—C.

THURSDAY, May 16th, 1895.

Dear JOURNAL: Fair skies were in order most of the day, as if to welcome the Presbyterian ministers, whose 100-and-odd assembly is now in session here. The order of papers to-day (the session was continuous, opening at 9:40 A.M., and ending at 1:10 P.M.) was: "Recuperative Furnaces as Applied to Bench Firing; Their Operation and Results," by Mr. J. A. Faux; "Ammoniacal Liquor," with Special Reference to the Universal Saving of Same by Gas Companies," by Mr. Geo. Osius; "The Best Method of Introducing Gas Engines," by Mr. C. B. Case—in the absence of the author the paper was read by Mr. E. G. Cowdery; "The Storage and Handling of Oils in a Gas Works," by Mr. D. J. Collins. These were all interesting and were well received, particularly so in the case of the last named, which provoked an entertaining discussion. The paper by Mr. Donald McDonald, of Louisville, Ky., on "Natural Gas as a Pioneer for Artificial Fuel Gas," was not read, on account of Mr. McDonald's absence. It was ordered to be printed in the proceedings. Then came the "Wrinkle Department," and Editor Thompson certainly deserves great praise for the quantity and the quality of the matter obtained, and for the clever way in which he handled it. No less than 13 "regular" Wrinkles were discussed, and the 13 were supplemented by 9 "Wrinklettes." The Question-Box also furnished a goodly number of nuts to crack, and, with their "breaking," was finished the strictly technical portion of the Western's 18th annual. The executive and routine business showed the election of 10 active and 10 associate members, and the roll call disclosed the presence of 97 delegates. The total attendance was not less than 150. The election for officers caused a genuine sensation, for the Nominating Committee had recommended a list headed by Mr. A. W. Littleton, whose retirement from the office of Secretary and Treasurer last year was received with honest regret. However, he is back again in harness, much to the exceeding satisfaction of everybody in and out of the Association, for whose advancement he has so long, consistently and successfully labored. The list of officers is:

President—A. W. Littleton, Quincy, Ills.
First Vice-President—W. H. Odiorne, Springfield, Ills.
Second Vice-President—S. M. Highlands, Clinton, Iowa.
Secretary and Treasurer—J. W. Dunbar, New Albany, Ind.
Board of Directors—Wm. McDonald, Geo. T. Thompson, Irvin Butterworth, W. M. Eaton, Geo. H. Harper, Peter Young, O. O. Thwing, Wm. Steinwedell.

The place selected for the next meeting is Chattanooga, Tenn. The Committee on Federation reported adversely to the scheme, and the whole matter was indefinitely postponed. The meeting was directed with such cleverness by President Baxter that the final business session was terminated shortly after 1 P.M., which will enable the members to visit the works of the Pittsburgh Gas Company. The ladies have escorts gallant and carriages gay, and they are now doing what they have been doing right along—visiting the many points of interest that abound in this wonderful city. The river trip to-morrow promises a most enjoyable outing.—C.

PITTSBURGH, FRIDAY, May 17, 1895.

Dear JOURNAL: The morning opened with glorious weather and the outlook for the trip along the Monongahela river to Homestead is most promising. The party will likely leave the Wood street wharf about noon, and the route as at present outlined is to Homestead, not disembarking there, but continuing on to McKeesport. The return trip will include a stop at Pittsburgh, to permit those who so desire to take early trains for home. The barge and steamer will then continue down the river as far as Davis Island dam, seven miles below the city. The return will be made in ample time to enable the visitors to take the regular night outgoing trains. There is every evidence that a good time is at hand. The feature of the entertainment last evening was a theater party for the ladies at the Alvin Theater, where Daly's Company (including the gracious and artistic Miss Rehan) gave a fine performance of the "Railroad of Love." These despatches would be incomplete without making mention of the excellence of the accommodations furnished by mine Host Brown, of the Monongahela House.—C.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.]

EIGHTEENTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD AT PITTSBURGH, PA., May 15, 16 and 17, 1895.

FIRST DAY—MORNING SESSION.

The eighteenth annual meeting of the Western Gas Association, held at the Monongahela House, Pittsburgh, Pa., on May 15, 16 and 17, was called to order at 10.30 A.M., of the 15th, by the President, Mr. Isaac C. Baxter, of Detroit, Mich.

The President then introduced to the convention the Hon. Mr. McKenna, Mayor of Pittsburgh, who welcomed the Association and its guests in the following words:

Mr. Chairman and Gentlemen of the Convention: I scarcely know what to say to a lot of gas men, for their's is a commodity that I do not know much about. If it were wind, or a different kind of (say natural) gas, probably I could say something to you about it. Gas we have plenty of here in the city, but I have not been used to it. However, I wish, as the Chief Magistrate of the city, to extend a welcome to you all, and especially to those who come from a distance, and to offer them the privileges and rights of Pittsburgh, and whatever they desire, in common with the residents of this town, while they are here. I would ask and advise those who come from a distance to visit our rolling mills and factories, and thus learn how the reputation for business as manufacturers has been obtained by the mill owners of Pittsburgh. In convention here I hope that all your deliberations will lead to the accomplishment of the purposes in view, and that, when you adjourn, it will be with a pleasant remembrance of the city of Pittsburgh. Wishing you all a pleasant time here, and again extending to you all a welcome to the city, I will no longer interrupt the regular order of your proceedings. (Applause.)

THE ASSOCIATION'S RESPONSE.

The President—I will ask Mr. C. H. Evans, of Chicago, to respond.

Mr. Evans—Mr. Mayor, Mr. President and Gentlemen of the Western Gas Association: The hearty words of welcome which the Chief Magistrate of this city gave to you cannot help but convince each one of you that we are among our friends. When our Committee reported in favor of Pittsburgh as the next place of meeting there were quite a number of misgivings amongst us, many thinking that perhaps a more Western town would be preferable. But, with such hospitality extended to us, who can now say that the choice of the Committee was not the wisest? If business or inclination should ever bring the Mayor of this city to any of our Western cities, I can assure him that the hand of fellowship will be extended; and should he desire to look around, just hunt up the local gas man, and he will be sure to see the town by day light or gas light, whichever the way may be. Just try us, Mr. Mayor; try us and see. I desire to extend to you, Mr. Mayor, the sincere thanks of this Association for your kindly words of welcome.

ROUTINE BUSINESS.

The President, having announced that, as the same had been published in the JOURNAL, the minutes of the last meeting would not be read, named the following gentlemen as a Committee on Invitation to Visitors, to act on behalf of the Association to welcome them: Messrs. W. H. Odiorne, John Young and E. G. Pratt. Mr. Odiorne, speaking for the Committee, said: If there are any visiting members here from other Associations we shall be glad to have them rise and be introduced to the members of the Western Association. [Several gentlemen rose.] Gentlemen, we are glad to see you here, and hope you will make yourselves at home; that you will have a pleasant time and be benefited by this meeting.

Mr. W. R. Addicks voiced the sentiment of the visitors when he gracefully thanked the Association for the warmth of its welcome.

The President then read the following

INAUGURAL ADDRESS.

Gentlemen of the Western Gas Association:

Introductory.—Another year with its trials and hardships, its sorrows and losses, its advancements and gains, its joys and pleasures, finds us again assembled upon a plane of fraternal equality; receding for a time from the individual, and considering only the common welfare of the great industry we represent; united in the purpose of comparing our theories, views and experiences, and prescribing each for the other's ills.

With feelings of mingled pleasure and regret this position of honor was accepted at your hands—pleasure at the assurance of trust reposed by you in me, and regret at my inability to perform its duties as others

preceding me have done. Fully realizing how many of our number were more thoroughly qualified to occupy this chair, there has been occasion for many misgivings, causing much hesitancy upon my part; but the knowledge that your earnest, hearty co-operation would be mine, was sufficient inducement for me to consent to act to the best of my ability in this present position. With a feeling of pride this gavel has been accepted from the hand of my very worthy predecessor, for one cannot be otherwise than elevated by so hearty an expression of the good-will, esteem and appreciation of this Association, to whose influence during the struggles of former years I feel myself so deeply indebted.

Resources of Pittsburgh.—When we learned that our eighteenth annual meeting was to be held in Pittsburgh, the Greater Pittsburgh (as we may say), and the Sheffield of America, there was cause for congratulating ourselves upon the splendid opportunities thus presented; for here, through Nature's marvelous gifts, God speaks in unmistakable tones to His creature man, appealing to his necessities and sympathies, bidding him to utilize the talents with which He has endowed him.

Pittsburgh, the name is the synonym of advancement, of the vastness of natural resources, of mechanical skill and business ability. Here, where less than two centuries ago a few scattered people were struggling for a home against the wiles and treachery of the savage, a new country has advanced, until to-day, we see Pittsburgh marching on steadily towards the head of the long list of the world's greatest manufacturing cities. Her fame is not confined by the deep waters of the Atlantic and Pacific; for these surrounding mammoth steel and iron works, numerous blast furnaces, large glass manufactories, great coal fields, vast oil and natural gas territories, and splendid shipping facilities, speak out in praise of the indomitable pluck and perseverance of her people to the inhabitants of both hemispheres. Is it a wonder that men seem to expand and grow taller when they proclaim themselves "Pittsburghers?"

As a former resident of this city, I can assure you that her hospitable gates are open to you, and regret exceedingly that time will not permit those visiting Pittsburgh for the first time to see but a small portion of her glory. My first introduction to the gas business is always recalled to memory by the mention of this place, and my friendly feeling toward the city is one found amongst all men who have made their homes within her doors.

Our Honored Dead.—Since our last meeting the sad intelligence of the death of our worthy and faithful friends, Geo. H. Wells, of Nashville, Tenn., and Henry Felt, Jr., of Cincinnati, has come with a shock to the knowledge of our fraternity. Well known through his long identification with our industry, it is difficult to realize that the familiar face of Mr. Wells shall grace no more these meetings, that his kind, cheerful voice is stilled forever, and that the warm blood is cold and stagnant in the hand we so often clasped in the strong grasp of friendship and brotherhood. His ready assistance and reliable advice will be greatly missed by the younger men who looked upon him as a great good friend. But his good works live after him, reflected by those whom he has befriended. It is not my intention to eulogize our departed associates, but we shall later on commit to some of their most intimate friends the task of preparing a suitable tribute to their memory.

Other Addresses.—So many entertaining and excellent addresses have been read before the various Gas Associations that it is almost an impossibility to select a new and interesting subject, but I hope that my treatment of several important topics pertaining to our interests may prove of some advantage to you.

Results of Past Year.—Considering the business depression prevalent throughout the country during the past year, and the sharp competition of electric lighting concerns, the increased consumption of gas, for both lighting and fuel purposes, argues well for the future prosperity of our business.

Incandescent Lighting.—In the competition existing between the two great lighting industries, the gas and electric, the Welsbach light, coming to our assistance, has caused a check upon the inroads formerly made into our business by our competitors. For some time this burner was looked upon in a doubtful manner, but is now a recognized success, a fact fully realized by electric light people in places where the new light has been pushed to the front. I can add little or nothing to the general knowledge of this invention and of its effect, as the past year has brought it so clearly to the view of all America that such information as I could give would be rendered both superfluous and unnecessary. It has so revolutionized modern lighting that the manufacturers meet with great difficulty in supplying the demand, and we find ourselves by its agency placed where we need have no fear of serious competition in cities where anything like reasonable gas rates are levied.

Prepayment Meter.—The question of introducing the prepayment or "penny-in-the-slot" meter has been agitated by the different gas companies for some time past. Like every new improvement, it is looked upon by many with suspicion and pronounced unreliable; but I can assure you this meter is not such a new thing. The large number of English companies by whom it has been used for several years, and their commendation of its work, is sufficient evidence of its assured success. Meters of this kind are on exhibition at the display of gas appliances, and the gentlemen in charge will take great pleasure in explaining their operation and advantages. It can be readily seen that they are so constructed as to render practically impossible any inaccuracy in the registration of the amount of gas delivered for each coin, and should counterfeit coins be dropped into the slot, they would fall into a box, to which the gas inspector alone has possession of the key, and, upon examination, such deception could readily be detected.

After the experience so many of us have had with the deposit system, we at length perceive a substitute which would put an end to much dissatisfaction. Our demand for a deposit, before meter and connections are placed at the disposal of a new consumer, constantly encounters his disapproval, for the reason that he is not always prepared to meet our demand without inconvenience to himself. With the prepayment meter he may buy from the gas company as he buys from the cash grocer, paying for his light as he desires to make use of it. There is no doubt that a great many have been deterred from the use of gas by misrepresentations in regard to the amounts of monthly gas bills. In case of the application of this meter there would follow a speedy reaction, and the payments being made in very small instalments would soon dispel the illusions which have become impressed upon the minds of the general public. This is not a theory, but has been proven an axiom by the experience of companies that have taken the initiative in this matter.

Gas Stoves.—Much satisfaction should be derived from the knowledge that the manufacturers of gas stoves are adopting the plan of establishing reliable and responsible agencies in most of the large cities and towns, especially where gas companies request them to do so, and where the trade has been allowed to take care of itself to an exasperating degree.

In many instances the duties of a superintendent and his associates are such that they have a choice of two things—first, to neglect the gas stove trade, or second, to neglect something probably more important. To such persons the placing of this business in the hands of some energetic and straightforward business man is the proper thing to do. The agent always has time to explain to a prospective purchaser, and can be depended upon, if assisted occasionally, to do the business justice.

The gas stove has long since advanced beyond the experimental stage, but people have been very tardy in recognizing the fact. The result of inquiries, made at the home of a friend where a gas range or heater is seen in use, is that the inquirer ceases to be a doubting Thomas, and in a short time has followed his friend's example and purchases "Comfort."

Its progress has been steady and satisfactory. In recent years we have seen the institution of several extensive manufactories, and in one case at least we find one of the largest coal range establishments in the world turn to the production of gas cooking and heating appliances. From my own observation of their work in that respect, and the information I have gleaned, they have met with no disappointment in their expectations, and others may be expected to fall into line.

Gas Engines.—The gas engine, by means of which we at one time thought our consumption would materially increase, has not advanced as we had hoped. A frequent comment upon this subject is that, when the manufacturers ask a price the mere mention of which does not stagger an inquirer and cause his hair to stand on end, then this motive power will be more generally adopted. The advancement of the gas engine has not been retarded by negligence on the part of our fellow superintendents; but I am sorry to say the error lies entirely to the discredit of others. We cannot accomplish much on this line until a fair article at a just price is produced.

One reason advanced for the excessive prices of gas motors has been their extraordinary weight and complicated construction. Does it not seem probable that there should be more rapid perfection of these engines, and that they could be constructed to meet the exigencies of the times? They have cheap electric motors and reliable steam appliances with which to contend, and I am of the opinion that a mode of producing power with a cheaper first cost and less operating expense with gas can be developed than any that has to the present time been introduced to our notice. Serious objections to former apparatus have been diminished or entirely removed, and there is nothing within the bounds of reason that man's ingenuity cannot be relied upon to accomplish, if

exerted upon the proper plane. Although some have gone to considerable trouble to show that electric and water motors are more desirable than those employing gas as an agency, we are forced to grant them no advantage except that embodied in the primary cost. With gas at a fair rate we can show a minor cost of operation and less wear and tear than either.

As a demand exists for the displacement of steam appliances, where not more than 10 horse power is required, gas engineers are inclined to assist in the introduction of a motor most favorable to their own interests; but they must have the co-operation of the manufacturers. It remains to be seen to what extent this co-operation shall in the near future extend; but it is to be hoped considerable more shall be accomplished during the succeeding year than the harvest of the past has shown. It behooves gas companies to give space to these motors themselves whenever it can be done. In our large plants are situated isolated buildings in which a limited power is required for various purposes, and here we can use such engines to advantage. By ascertaining their results through personal contact with them, our recommendations to consumers will seem more plausible.

Street Car Propulsion.—Information in regard to street car propulsion bids fair to cause a revolution in our city railway systems. The matter of the practicability and economy of cars propelled by the gas motor as an agency of power has been investigated thoroughly and has been clearly demonstrated by strict and reliable tests.

What are the advantages of the adoption of the gas motors in street railway service? A very obvious one is that the stringing of a network of dangerous electric wires would not be required. It would also put an end to one of our most deadly enemies—electrolysis—and to a source of dangerous interference with telegraph and telephone wires. We are able to say to its credit that each car would be independent of any central power station, and, in case it should meet with an accident, would not become an obstruction to the progress of others, as it could be readily attached to another car and removed to the repair shop. It seems to me (viewing the experience of myself and others with whom I have conversed upon the subject) that accidents at electric power stations have generally occurred at a time when service is most in demand. We have been informed of the great expense of construction of the cable, the noise and danger of the trolley, and of the high operating cost and unreliability of the electric systems.

In reference to the gas motors we may notice some experiences. The following results of practical tests made at Dresden are cited among these.

Cost of construction for a 5-mile, double-track road, 20 cars, all wires, horses, motors and other equipments included:

By gas motor system, cost	$28,500	per mile.
" electrical " "	36,200	"
" horse car " "	26,700	"

The net operating expenses follow:

By gas motor system	6.0 cts.	per mile.
" electrical "	8.0 "	"
" horse car "	10.0 "	"

And show an economy of 25 per cent. in favor of gas against electricity as an agent of power, and an average of 40 per cent. against the adoption of the horse car.

Although these motors have been in use a comparatively short time, they have already made wonderful advancement. They are receiving the attention of the ablest mechanical minds in the world, and among the many improvements have been the reduction of weight and an increase in the maximum speed from 6½ to 15 miles per hour. They easily ascend a grade of 1 in 20, and have rounded curves with the short radius of 38 feet. Results upon transit lines operating them have been so satisfactory that horse cars are being rapidly displaced, extensions to existing railways made, and new lines constructed. So much having been accomplished before this method has received an introduction to Yankee ingenuity, we can expect some remarkable results should enterprising American manufacturers see fit to commence their construction. A model is expected very soon, and then our people will be brought to a realization of what it truly is. This is a matter in which it is to be hoped the representatives of this, the fifth ranking industry of this nation, with its capital investment of over $258,000,000, will take the deepest interest.

During the first year of operation, at Dessau, Germany, the consumption of gas has averaged about 500,000 cubic feet per car. By ascertaining the number of cars in operation in your respective cities you can easily calculate the amount of revenue your companies may expect each year upon the general adoption of this system. These facts, clearly demonstrating that the mind of the inventor, in searching for the most available power, is again ready to consider the entire field and not confine himself to electricity alone, are of vast importance to us, and should lead to the accomplishment of something in our country. Should the gas motor be adopted in the street railway service, an enormous increase in consumption would ensue, as such an event would be accompanied by a decreased rate to consumers, both for fuel and lighting purposes, and would enable us to extend our business among those whom we cannot now reach. One advantage can always be relied upon to clear the pathway for others.

Marine Engines.—Attention has been recently directed to the application of the gas motor in another direction—namely, as an agent of power for marine navigation. A few months ago there was completed a 400-ton propeller, equipped with a 40-horse power gas engine and compressing tanks with a capacity sufficient for a voyage of 400 miles. The engineer, to whose energy and talent this experiment is due, is entitled to our sincere plaudits, and, as business men, we feel deeply interested in the ultimate success of his enterprise, as such a result will mark another important epoch in the advancement of our industry. The logical conclusion is, that if such vessels can be constructed for comparatively short journeys, they can assuredly be made suitable for traveling greater distances. We may, therefore, soon observe the dawn of a day when the gas engine shall be employed as an important agent in the world's great commercial transfer lines. The idea is certainly a feasible one, and while we cannot reasonably expect to see instant perfection in the method, we may be confident that the final results acquired by the thorough application of competent engineers will prove satisfactory to our interests.

Oil-Water Processes.—This may be called an era of oil-water gas processes. Companies throughout the country are being tormented today by circulars putting forth in their best light the claims of numerous methods, some of which are the inventions of deluded persons whose infinitesimal minds have been subjected to too great an application to matters with which they are really unacquainted. When a man with some scattered (half theoretical and half mechanical) ideas has nothing particular to do, he immediately gives himself up to the pursuit of invention; and in the majority of cases when he does so, some other person eventually finds himself under the burden. In many of these pamphlets the well informed can readily detect the presence of considerable assumption of impossible results, and presumption upon the ignorance of people to whom they hold out a baited hook. We receive inquiries in regard to a certain apparatus recommended to some company, and in reply are forced to admit we know little or nothing concerning it, as an investigation generally brings out the fact that the process mentioned is used merely in one or two isolated villages; and in one of these we invariably discover the patentee. If things continue as they have recently begun, the water gas people who are putting out first-class machinery, and whose results are as good as their word, must take some steps to protect themselves. Some companies have been greatly imposed upon; a few have realized this, while others have not.

A few oil-water plants, erected upon very flattering promises of ambitious and bombastic inventors, have, upon practical tests, been found to be far less economical than represented, while others have exceeded the claims of patentees and constructors. To many inland companies, situated conveniently near the oil fields and refineries, there is no doubt oil-water plants are most desirable, as railroad freights in some instances are very exorbitant and increase the price of coal to a great extent. Persons possessing no practical knowledge of these different methods, but expecting in the near future to erect oil-water gas apparatus, would find it advisable to obtain from experienced engineers statements of results obtained from different processes, thus enabling themselves to select that apparatus giving the most beneficial results.

We note with pleasure the steady growth of this branch of our industry in foreign countries. Advertisements requesting additions to the number of constructing engineers already sent over from America are found inserted in many editions of our various scientific journals, and we should desire to satisfy these people that our great nation is not deceiving them; that when we say we have a good article for the world at large, we have it and give it for what it is worth. Justice demands that we should prevent any imposition upon our neighbors, and that they should be advised against the frauds developed in the past several years. The Golden Rule is one not universally practiced in business, but we have the first time to learn where it has injured either party when strictly adhered to. When your neighbor asks for bread, do not give him a stone.

Residuals.—Much has been said at former meetings in regard to the sale of residuals obtained by the distillation of coal—namely, coke, coal tar and ammonia. Presuming that all coal gas companies here

represented are making ready and profitable sales of the first two bye-products named, I cannot refrain from calling your attention for a short time to the third. Should the inquiry be made of all companies carbonizing 5,000 or more tons of coal per annum, whether or not they were utilizing their ammonial liquor, I am quite positive many negative answers would be received in response. By some, too little importance has been attached to this product, so indispensable to the human family, and so profitable to companies which have seen fit to concentrate their weak liquor, or to manufacture ammoniacal salt. For instance, a plant carbonizing 5,000 tons of coal per annum could produce 40 tons of concentrated ammoniacal liquor of 80 oz. strength, equivalent in bulk to 8,000 gallons. The product of one year could thus be consigned to the purchaser in two or three tank cars, and, in a plant of the capacity mentioned, would require the services of but one intelligent laborer for about 3 hours per day during each of, say, about 60 days, allowing sufficient time on these days to accomplish other labor about your works. The cost of operation is merely nominal, as it would not create the necessity of adding even one extra man to your old force.

As the different ammoniacal products and their uses may have escaped the observation of some of our members, I concluded to mention a few of them: Aqua ammonia, regarded by many as an indispensable household article; carbonate of ammonia, which finds its way into many of the most common articles of food; ammonium sulphate, most extensively employed as a fertilizer; ammonium chloride, the well known sal-ammoniac; a crystallized muriate of ammonia, used to a great extent in electric batteries; anhydrous ammonia, the great demand for which is being rapidly increased by the addition of many ice manufactories in our southern cities, and others having various uses. The concentrated liquor and refined ammonia are used in the manufacture of the above named compounds and also in the process of making soda ash.

At this time of sharp competition, with reduced gas rates and decreased revenues from our coke and tar, both of which products (especially the latter) have diminished considerably in value during the past few years, but which I am glad to say have recently shown a substantial increase, your ammoniacal product has thus become a very important item, and it is not so difficult to dispose of, as it is a product for which there is a demand at all seasons of the year. It is a cause of grievance to me to know that so much of it is allowed to be completely wasted. The machinery employed in concentration has been so cheapened and simplified by the improvements of later years that a very small lapse of time would enable you to pay the first cost of erection; and, in fact, considering opportunities some companies have wantonly rejected, I am sure some inducements already made by manufacturers to others would be very surprising to those of you who are not acquainted with this matter.

Fuel Gas.—The question of gaseous fuel is one of deep moment, not to us alone, but to the general public, whose great demand for such fuel is being daily heard. Here, then, arises a question which deserves our prompt attention. How are we going to satisfy this demand? In cities where natural gas cannot be obtained, and in natural gas districts where the supply is becoming inadequate to the demand, there must be something done toward relief from the use of solid fuel. It remains to us, as gas engineers, to solve this great and important problem, and to determine what is the best and cheapest method of manufacturing a fuel gas of the highest possible calorific power. Some may say it has been done, but pause and ask yourselves again, "Has it been done in the proper manner?" A partial solution of the problems arising will be of no benefit; we must determine exactly how to meet all requirements in respect to economy, heating properties and the variability of the demand.

In this city and Allegheny the consumption of natural gas is much greater than that of any other cities of our country both for domestic and manufacturing purposes. As gas wells are being abandoned, new ones are being opened to supply their enormous demand. What are these cities going to do when they can find no new wells to yield their wants? There is every evidence that the total exhaustion of this immediate territory is fast approaching, but I know of no section of the country better adapted to supply an artificial substitute; none with greater facilities at hand.

In the Connellsville region, about 50 miles from this city, the beehive coke ovens convert millions of tons of coal into salable coke each year, and within a radius of the same number of miles about Pittsburgh, over 65 per cent. of the American coke is produced annually from the best gas producing coals in America, namely, the Youghiogheny, and the first, second and third pool coals. A large amount of gas and all the valuable coal tar and ammonia belching out at the top of the ovens are totally wasted. Such extravagant waste of the most valuable products of the carbonization of coal is due to a large extent to the use of an antiquated coke oven, the existence and operation of which greatly disappointed the English Society of Iron and Steel Engineers who visited this section about three years ago. This Society concluded (and justly too) that we were far behind our trans-Atlantic brethren in this matter, they having wisely taken measures to use all obtainable products.

Before the extraction of tar and ammoniacal liquor became a recognized accessory to the manufacture of coke, there existed a belief that only an inferior quality of coke similar to that obtained in our gas plants, and unfit for metallurgical purposes, could be obtained from any other than the beehive oven. The improved ovens of Apoldt, Semet, Coppee and others, have been for over 30 years in general use in Germany, Belgium and France, and their results have dispelled this illusion in England during the past decade. There the supposed infallibility of the old beehive oven has been obliterated, and such apparatus is being rapidly displaced by the methods of a later and more progressive date.

The process of extracting tar and ammonia by distillation in the manufacture of coke originated in France, remaining stationary for some time, but since the year 1881, when Germany began to take an interest in the matter, its advancement has been vigorous and rapid. The first furnaces adapted to the utilization of all products were due to the genius of Monsieur Knab, of St. Denis, near Paris, in the year 1856, but the method of preserving the tar and ammoniacal product was introduced by Hauport and Carves, the latter gentleman also effecting some improvement in the arrangement of furnace flues. In the apparatus the gases generated were passed into an hydraulic main, the tar and ammonia extracted, and the remaining gas drawn off by an exhauster and forced into the furnaces, thus being utilized as an agent of heat.

I shall not attempt a description of the numerous coke ovens patented during recent years, but shall give some notice to a few such inventions as are intended to utilize the gaseous products for heating purposes. It has been clearly demonstrated by experience that tarry products, similar to ordinary coal tar, and containing quantities of benzol, naphthaline, anthracine and other hydrocarbons employed in the manufacture of drugs and aniline dyes, cannot be produced by ovens of the open kind admitting air. Attention is called to the excellent results and assured success of the Simon-Carves, the Ruperts, the Otto Hoffman and the Semet-Solvay ovens—the latter system being in use in the Solvay works, at Syracuse, N. Y.

The following is an abridged description of the Simon-Carves arrangement: It consists of a large oven, similar to a huge gas retort placed over the furnace, to an opening at the top of which coal is conveyed in cars, having a drop door at the bottom; the coal is thus simply dropped into the retort, and after it has been carbonized the resultant coke is pushed out by means of a steam ram. The gas is drawn away by an exhauster, and passes through the ordinary coal gas process, being subjected to condensing and scrubbing apparatus. The gas after this process is brought back by pipes and is burned under the combustion chambers of the furnaces and boilers. It may interest some to know that, in 1860, at the La Villette Works the Paris Gas Company had in operation ovens for the production of metallurgical coke. The gas produced, being of an inferior quality, was mixed with a richer product made in ordinary retorts, and thus was utilized.

At no time since the introduction of gaseous fuel has the subject of an artificial substitute for natural gas attracted so much comment and produced so many able discussions as within the past few years. Although our journals have devoted a great quantity of space to our business colleagues upon this matter, there have been many points raised which cannot be said at present to be definitely settled. Why should the supply demanded by the residents of Pittsburgh and the neighboring cities not come from the adjoining coke-producing districts? By abandoning the present extravagant ovens, substituting furnaces and retorts similar to the Simon-Carves arrangement, erecting necessary condensing, scrubbing, purifying and storing apparatus, and laying adequate mains, this could without doubt be easily accomplished, and fuel gas furnished at a reasonable price. The contemplated failure of natural gas should not under existing circumstances be viewed with alarm by these cities.

The greatest obstacle to the adoption of a fuel gas made entirely from coal is the necessary construction of immense gasholders required to distribute the product most economically. Storage capacity exceeding the maximum daily output is, if not exactly essential, at least desirable to any producing plant, as it provides for accidents which may require

a discontinuation of operations for a period of several hours. Experience with coal gas has impressed upon engineers the great expense of intermittent work; and failure of supply inevitably delivers a blow to gas companies from the effects of which a considerable time is required for recovery.

I deem it advisable to call your attention to some experiences of our own Company with natural gas. We have found that the maximum demand exists for about six consecutive weeks in the year, and during several weeks prior to and succeeding that time we have experienced very cold weather, creating for a short time only about the same daliy demand. The rate of consumption has upon several occasions increased 140 per cent. within a very few hours, owing to sudden decrease in temperature. An increase of from 100,000 to 240,000 cubic feet per hour in the rate of consumption is of frequent occurrence, and thus, in 14 hours, were we supplying a manufactured fuel gas, we would be compelled to meet the difficulty arising from a sudden demand for an increase of 1,960,000 cubic feet in that time. The output during the remaining 10 hours being meager in comparison, no material addition is required to these figures. We should be compelled, if operating any of the fuel gas apparatus now in use at other cities, to keep a certain amount of skilled labor, during a major portion of the time having absolutely nothing with which to keep it employed, and a wasteful consumption of fuel would be necessary to keep the plant ready for the requirements of a decreased temperature.

Now we are asked what plan is proposed to avoid this in the plant aforementioned. Simply this: A number of ovens could be kept in reserve for repairs, and those required for the maximum output could be kept in operation during that season when the greatest production is essential. When the total amount made is not required by consumers, by a simple valve arrangement the surplus gas could be utilized as fuel under the ovens, and by the heat generated in its combustion the carbonization of coal and manufacture of gas could be continued. Should the rate of consumption suddenly increase, solid fuel could again be brought to the rescue. The number of ovens in use could be regulated to suit the demands of the various seasons.

The quality of gas generated would be that of a straight coal gas of 12 candles; and if this method were adopted by gas companies the product could be utilized also for illuminating purposes by being mixed with a richer gas in the gasometer. Where coal can be obtained at a reasonable rate, the method proposed could be adopted with advantage.

According to the United States geological survey for the year 1893, there were consumed in the manufacture of coke, in this immediate district, 9,336,702 tons of coal, from which were produced 6,229,051 tons of coke. The average results obtained from slack coal per ton of 2,000 pounds, carbonized in retorts, are as follow: 9,000 cubic feet of 13 candle gas; 1,260 pounds of coke; 11 gallons of tar, and 16 pounds of 80-ounce ammoniacal liquor. Therefore, the amount of coal aforementioned would yield 84,480,318,000 cubic feet of 13 candle gas; 11,887,244,520 pounds of coke; 103,253,722 gallons of tar, and 150,187,232 pounds of 80-ounce ammoniacal liquor.

Your attention having been previously called to the fact that coke alone of all these products is utilized, you can now perceive the enormity of the waste resulting from the use of these antiquated ovens.

From approximate data at hand it is found that 989 artificial gas companies operating in the United States produced, during the year 1894, 52,642,000,000 cubic feet of gas; and it is no doubt somewhat surprising to this fraternity to consider that this amount is over 37 per cent less than that annually allowed to ascend from the craters of these Western Pennsylvania ovens. Granting that at least 60 per cent. of the gas made by these 989 companies is oil-water gas, then the deficit, considering coal alone, is over 75 per cent. In other words, while the companies of our vast territory producing coal gas are carbonizing 250 tons of coal, the gaseous products of over 1,000 tons are being lost in a very small comparative section. The realization of this fact more firmly fixes in our minds the propriety of the old adage, "Truth is sometimes stranger than fiction."

Having considered a change in the coking systems by which all products could be saved and utilized, and the disposition to be made of the gas manufactured, we are now confronted by questions in regard to the sale of the remaining products—namely, coal tar and ammonia. The answer to these questions may be condensed by the observation of two well known facts: 1st, the constant displacement of coal gas by the greatly increased manufacture of oil-water gas; and, 2d, the steady growth of the industries of our nation, creating a greater demand for these by-products. In addition to the importation of large quantities of pitch and refined materials obtainable from coal tar each succeeding year, about one-half our total consumption of ammoniacal compounds is purchased from foreign countries. With the knowledge at hand that our gas works furnish but a small proportion of the American products, there seems no reason at present why the coke companies should meet with any considerable difficulty in obtaining a ready and profitable market for these residuals. These imports are not occasioned by excessive American prices, but by a deficit we cannot at present supply. In the treatment of this subject I regret that time does not permit me to say all I would; but if something has been offered toward the solution of an interesting and complicated problem, I shall feel that my effort has accomplished a desirable end.

Calcium Carbide.—"Calcium carbide" and "acetylene" are names which have met the view of the gas world as spectres of the night. As we have been promised a very interesting paper upon this subject, I shall pass it over with the expression of but few words. We have been so often threatened with complete and sudden annihilation by new discoveries, that former circumstances would warrant the assertion that if this new gaseous product "acetylene" is to be an enemy, we can certainly find some means of sturdy warfare, and if it proves an auxiliary it shall meet with spontaneous welcome from our fraternity.

Municipal Control.—Proceeding to the question of municipal control of gas plants, a theme upon which there has been much thought and many debates, very little comment is necessary. Elaborate arguments have been made setting forth the marvelous success of many of the water works and electric lighting enterprises controlled by local governments, but I venture to state that, were the conditions of these institutions sifted to the bottom, there would be found a prevailing state of dishonesty and treachery to the public trust. And why? Because in order to maintain certain parties and people in power, the ward heeler must receive a reward for his patriotism in the form of an easy position which shall necessarily not interfere with his political work, and attached to which must be provided a reasonable salary paid from taxes collected from the public. Numerous instances of this kind could be cited by my fellows of this Association, as I presume that almost all of our members have at some time discovered some such conditions of affairs.

We have the authorized statements of men of experience in municipal affairs to support these assertions, and the developments of investigations made clearly decide the existing fact that, under the present system, municipal control of public plants is, in a majority of cases, accompanied by more detriment than benefit to the majority of persons interested, and is, generally speaking, the outcome of a desire for revenge upon some unpopular corporation or persons.

Opportunities of our Young Men.—Opportunities offered our young men for advancement to-day are much greater than when many of us served our apprenticeship and during our earlier years in charge of plants. To-day the young man has an opportunity of improving himself by the study of chemistry, geometry, civil and mechanical engineering, and other sciences—aids to a gas engineer at all times. These are opportunities our young men should grasp, as they cannot afford to lay aside such an important matter as advancement in their chosen vocation. The practical man, with his knowledge of mechanics and routine work, and the theoretical man, whose knowledge is based upon a clear understanding of the sciences, are each desirable articles; but a man who is a combination of the two, certainly combines their value also. Do not plead lack of time, for no such thing exists. There is truth in the old assertion relating to a time and place for all things. Young men have been known to labor at the most menial callings by day, and during the evening hours devote time and attention to more important matters, by which in later years they were lifted far beyond the average.

It is to be sincerely hoped, as time progresses, the number of gas engineers with good executive ability, who can draw a company's plans, perform chemical experiments pertaining to its products, and be able to turn a hand, when necessary, to mechanical work, shall steadily increase; and if we are compelled by circumstances to employ others to accomplish such labors as these, it should surely give us the greatest satisfaction to know when they are performed in a correct manner. The advancement of the times demands that we should acquaint ourselves with the cause of problems commanding our attention, and the effect of their solution.

Conclusion.—Some words of appreciation are due the editors of the American Gas Light Journal and the Progressive Age, whose efficient services have contributed greatly towards the elevation of the gas industry, by their ready explanations of interesting problems and other valuable information expressed through their columns. At no time since the publication of the first copy of an American Gas Light Journal have we been represented in such an able manner by a press

devoted to our interests, and it is gratifying to know that our fraternities duly recognize their services.

My thanks are publicly expressed to Mr. Jos. D. Weeks, editor of the *American Manufacturer*, of this city, for the great assistance derived from his work on the "Manufacture of Coke," and to Mr. E. C. Brown, of New York, to whose valuable "Directory of American Gas Companies" I am indebted for aid in the compilation of statistics. This latter work is deserving of more encouragement from its real beneficiaries (the gas companies) in the future than it has hitherto received. Incomplete reports from many cities rendered it necessary to make approximate estimates in such cases, and there is no apparent reason why the editor should not obtain all desired information in a cheerful and prompt manner from the officials of the various companies. The work certainly deserves our patronage, and should receive it.

With an expression of my deep appreciation for the kind attention accorded, I shall conclude these remarks, hoping that, with the advantages at hand and discussions to follow upon papers of interest and intrinsic value to our future welfare, this meeting shall be made one long to be cherished in the hearts of our Association, to whose former gatherings we are now able to refer with sensations of genuine pride.

The address was referred for analysis to the following Committee: Messrs. E. H. Jenkins, Irvin Butterworth and E. G. Cowdery.

The Board of Directors submitted the following report:

REPORT OF BOARD OF DIRECTORS.

The annual meeting of the Board of Directors of the Western Gas Association was held at 11 A.M., Tuesday, May 14th, at the Monongahela House, Pittsburgh, Pa., and was called to order by the President, Mr. I. C. Baxter. The following members of the Board were present: Irvin Butterworth, Geo. T. Thompson, Wm. McDonald, James Forbes, W. M. Eaton, Robert Young, J. W. Stratton.

On motion of Mr. Thompson, the following papers were accepted for presentation to the Association:

"Incandescent Gas Lighting," by Mr. S. M. Highlands, Clinton, Ia.

"Metal Gasholder Tanks," by Mr. Alten S. Miller, Long Island City, N. Y.

"Advantage of the Metric System for All Calculations," by Mr. Geo. H. Harper, Altoona, Pa.

"Natural Gas as a Pioneer for Artificial Fuel Gas," by Mr. Donald McDonald, Louisville, Ky.

"Acetylene," by Mr. F. L. Slocum, Pittsburgh, Pa.

"Experience with Foul Gas," by Mr. Jas. P. Lynn, Detroit, Mich.

"Ammoniacal Liquor, with Special Reference to the Universal Saving of Same, by Gas Companies," by Mr. Geo. Osius, Detroit, Mich.

"Recuperative Furnaces, as Applied to Bench Firing: Their Operation and Results," by Mr. J. A. Faux, Pittsburgh, Pa.

"Best Method of Introducing Gas Engines," by Mr. C. B. Case, Milwaukee, Wis.

"The Storage and Handling of Oils in a Gas Works," by Mr. D. J. Collins, Chicago, Ills.

"Wrinkle Department," edited by Mr. Geo. T. Thompson, St. Louis, Mo.

On motion of Mr. Butterworth, it was carried that the hours of 9:30 A.M. and 1:30 P.M. be selected as the time for convening the meetings of the Association—Eastern time to govern.

The Secretary read his report of receipts and disbursements as follows:

TREASURER'S REPORT.

Receipts.

To membership fees	$145.00
" annual dues	1,033.00
" sale of badges	45.50
" balance from May 1st, 1894	395.81
	$1,619.31

Disbursements.

By Secretary's salary	$400.00
" sundry bills, as per vouchers	887.73
" balance cash on hand, May 1st, 1895	331.58
	$1,619.31

The President appointed the following Committees:

Auditing Committee—Geo. T. Thompson, W. M. Eaton and James Forbes.

On Applications for Membership—Wm. McDonald, Irvin Butterworth, E. H. Jenkins.

On motion of Mr. Thompson, it was carried that the Association visit in a body the exhibition of gas appliances, after the adjournment of the first day's session.

On motion, the Board adjourned.

JAS. W. DUNBAR, Secretary.

[To be Continued.]

Frost and Gas Supply.

[A paper read by Mr. W. HARDIE, JR., of Tynemouth, before the 36th half-yearly meeting of the North of England Gas Managers' Association.]

The subject of this short paper is not one that frequently comes up at our meetings; but as it is one that probably claimed some attention from most of us about the beginning of last February, a few remarks on some of the inconveniences which the frost causes in certain parts of a gas making and distributing plant may be permitted. The frost then experienced is said to have been the most severe and continuous for about 30 years; certainly, if the damage done to gas and water mains is taken as a guide, it would seem to be without any precedent.

On the works, the pipes supplying water to the various buildings and plant are liable to get frozen up; but the parts most exposed to attack are the water supply to scrubbers, the water supply to hydraulic valves (where these are used), and the freezing in the lutes of gasholders and purifiers. The supply of water to our scrubbers at Tynemouth is taken from an overhead tank, fixed above the boiler house; and it is carried side by side with a small steam pipe to the water distributer on the top of the scrubber. The water and steam pipes, where exposed to the air, are wrapped round with straw rope, and incased in a wood box filled with sawdust. This arrangement worked satisfactorily, and the water and ammoniacal liquor supplies to the scrubbers were constant during the frost. The temperature of the gas going into the scrubbers was never under 60° F., and probably much of the inconvenience in scrubbers and washers might be avoided by laying off a portion of the condensers, so as not to cool the gas excessively.

Our purifiers are fitted with hydraulic valves, and are supplied from tanks at one end of the house, through 3-inch and 4-inch pipes. The water through the leading supply pipes was kept circulating by running a small quantity off at the end farthest from the supply tanks; and the water was kept warm by supplying a little steam into the pipes at a point near the tanks. This arrangement worked very well, though some of the valves and pipes farthest from the leading water pipe did freeze a little. Regarding the purifier lutes, it was found sufficient to turn a steam supply into them occasionally. Our arrangement for working the purifiers is as follows: The gas first passes through two purifiers, each 24 feet square, and it is then divided into two streams, and passes through two sets of purifiers, each containing four purifiers 20 feet by 15 feet.

We had rather a curious experience with one of these purifiers during the frost. This purifier had been filled with lime that had been prepared two or three days previously, and was not put to work for about 48 hours after being filled, when it was found that the gas would not pass through it. Means were taken to make sure that the valves and pipes were quite clear, after which it was decided that the severe frost acting on the moisture in the lime had caked it into a more or less solid mass. The gas was then forced through it at a high pressure—the difference between the inlet and outlet of the purifier being about 12 inches water pressure—and steam from a ¾-inch pipe was allowed to play upon the inlet pipe. The heat caused by the steam and by the chemical action of the impurities of the gas upon the lime, caused it gradually to come to its normal condition; and in about three hours the gas was passing through with a difference in pressure of about 1 inch.

Only one of our gasholders has up to now been fitted with steam pipes, it having been found sufficient with the others to break the ice in the cups with a spade, when they came down to about 3 feet from uncupping. Temporary steam pipes were found desirable this winter, and these will certainly now be fixed permanently.

As showing the very extreme nature of the frost, I may mention a case in which a small gasholder in a wrought iron tank became quite ice-bound, and stopped the supply of gas. This was remedied by placing coke fires at intervals around it; but the best plan for small gas works is to have a portable steam boiler, for which many uses, in addition to keeping the holders right in frosty weather, will be found.

But if a frost causes inconvenience in the manufacturing plant, its effects are much easier to prevent and cure there than in the distributing system. The number of escapes of gas, and of stoppages in consumers' and public lamp services, are largely increased at such a time.

The number of broken mains in North Shields during the frost was six. These all occurred in 3-inch and 4-inch mains, and the minimum cover of ground over them was 24 inches. Our near neighbors at Newcastle had 54 broken mains, the sizes being as follows: Four 2-inch, forty-five 3-inch, two 4-inch, one 5-inch and two 10-inch. The cover of ground in these cases varied from about 24 inches to 36 inches. In "King's Treatise on Coal Gas" (Vol. II., p. 362), it is stated that the depth of cover for pipes less than 8 inches in diameter should not be less than 21 inches; and above that size, from 2 feet to 2 feet 6 inches. These are about the depths of cover generally adopted. If, however, our climate so changes that frosts such as we experienced last winter come often, the advisability of laying our mains at a greater depth must be considered; but while they remain so abnormal as at present—coming only about once in a lifetime—the plan of laying mains a depth of 3 feet to 3 feet 6 inches does not commend itself to me.

As regards consumers' complaints of bad supply of gas, I find that the number of complaints during February, 1895, owing to the frost, was 10 times the number during February, 1894; and the highest number in one day during the frost was 50 times the daily average for the corresponding month of the previous year. Notwithstanding this large increase in complaints, they were in almost every case remedied the same day. The cause of these stoppages appears to be that the moisture in the gas—which may amount to 1 per cent.—is condensed and frozen, and that some hydrocarbons of the benzene and naphthaline series are at the same time deposited. That some of the light-giving hydrocarbons are deposited, is shown by the loss in illuminating power when these deposits occur; and that this is caused only by moisture in the gas, is proved by the fact that no deposit takes place on passing the gas through a freezing mixture of salt and snow, if the gas is first sent through drying tubes of calcium chloride. The usual method adopted to remove these obstructions is to pour salt and boiling water down the service, and then use the air force-pump to drive it into the main pipe. With the lamp services, we generally use a steel wire down the pipes, before employing the force-pump. Occasionally using the force pump blocks the service so hard that it can only be cleared by lifting the ground; but this is fortunately a rare occurrence. We have also used a "non-freezing composition" for removing the lamp stoppages, which our workmen consider assists them very much.

In this short paper, I have laid before you our own experience and observation; and I hope the few facts mentioned may not be entirely without interest. There are, however, many gentlemen here who must have had similar experiences; and if, as the result of these, they are able to make some practical suggestions as to the best way to deal with such a state of things, we should be pleased to listen to, and learn from them.

Discussion.

Mr. H. Tobey (Malton) said they were all much obliged to Mr. Hardie for recounting his experiences during the late frost. Most of them, he had no doubt, had had some trouble during that period of vexation and annoyance, from stopped pipes and frozen meters. The author had referred to the arrangement with regard to his scrubbers. Mr. Hardie appeared to have upon his works a steam boiler which was always going, and from which he could at any time get a supply of steam, to apply where he wished it. But in some works, no steam boiler was employed—only gas engines were; and in such cases the difficulties in working a water scrubber were very considerable. After a year or two's experience he had come to the conclusion that he ought to put in one of Fletcher's gas heated boilers. The pipes from it were taken round the scrubber, or to the top, and he found it very effective. It kept him clear of ice during the past winter. With regard to the freezing of the lutes of the gasholders, it was certainly difficult, in a frost like that of last winter, to keep them clear, though, no doubt, it could be done by steam or by salt and water. The salt and water would, however, require considerable attention. Mr. Hardie had given them some statistics with regard to breakages in pipes; but he had not given them any reason, or explained as to why these mains broke—whether it was from contraction on account of the cold, or otherwise. He (Mr. Tobey) was rather doubtful himself as to how a main, situated so deep, could possibly be fractured by contraction from cold. Putting hot water down a service pipe led with him to the blocking up of a main, and for a short time the supply of gas to some houses was entirely stopped.

Mr. E. H. Millard (Durham) said, with reference to Mr. Hardie's proposal to bye-pass part of the condensers, that the object of the condensers was chiefly to get rid of the tar; and he thought it would be a very poor matter to bye-pass the condensers and thus get tar into the scrubbers. It would be much better to maintain the temperature of the gas so that there would be no fear of the water in the scrubbers reaching anything like freezing point. In Durham they were unfortunate in respect of the mains and services being exceedingly shallow; but by prompt attention to complaints and the use of a non-freezing compound—which, by the way, the men took out boiling hot—they were able to keep nearly all their services clear by means of a very small quantity of the liquid. He found that with the public lamps, regarding which they had frequent complaints, in every case the stoppage was due to the elbows on the service pipes at the base of the pillars. He had renewed them, putting in bends, so as to do away with the difficulty.

Mr. T. Bower (West Hartlepool) said this subject was one in which they were all interested. A few years ago he had two systems for reducing the capacity of the condensers. He had eight tubular condensers, and there was a bye-pass arrangement whereby he could have four on and four off. He used this for three weeks; and, finding it was not to his satisfaction, he made an arrangement of flaps, fastened to longitudinal spindles along the top and the bottom of the condensers. These were fitted on to a main spindle, and were revolved by a ratchet and wheel at the end. When he wanted to reduce or increase the temperature, all he had to do was, instead of bye-passing part of the condensers, to open or shut the flaps at the top or base either partially or altogether. By closing the flaps, he reduced the quantity of air passing through the internal portions of the condensers; and so he kept up the temperature. To his mind, this was a better arrangement than bye-passing the condensers. He thought it was a matter which should be attended to, because there was no doubt that if they reduced the gas below 40° F., at the condensers, and then had to raise it by passing it through or over mechanical contrivances, such as scrubbers, they were bound to have more or less trouble with naphthaline. It seemed to him that if they watched the scrubbers more carefully, they might possibly be able to avoid naphthaline. He had very little trouble last winter with the governors, which were in a sheltered position. Hitherto he had not found it necessary to heat the governor house; but, after his experience of last winter, he should certainly have it heated. One night the water there was frozen quite solid, and if it had not been for an arrangement of bye-passing and getting on to another governor, serious results might have followed. As it turned out, they had only a little temporary inconvenience. He had much more trouble with the gasholders than he ever had before. He had no steam, and he had simply to resort, time after time, to the simple breaking of the ice by hand, which was not only troublesome and expensive, but dangerous in several ways—such as piercing the plates of the gasholder, damaging paint, etc. Before another winter, he hoped to have something done to enable him to deal with ice in the gasholders. His difficulty was in deciding which was the best method to adopt. All the tanks in his works were underground, and he would have to consider whether an ordinary steam pipe led into them would be sufficient. It was very annoying both to gas suppliers and to gas consumers to have constant complaints of stopped gas. Many people did not complain of the stoppage of the gas, but of "the bad quality of the gas;" and Mr. Hardie was quite right when he mentioned that if they had a deposit of naphthaline, they were bound to have a reduction in the illuminating power. Consequently, a less quantity of gas passing to the burners, of a lower illuminating power, doubly aggravated the matter; and consumers, not knowing this, very often blamed them for supplying bad gas when it was not owing to bad gas at all, but to the naphthaline.

Mr. J. Armitage Drake (Halifax) said he recently came across a contrivance, whereby, by taking off the ordinary water cooling tanks connected with a gas engine and coupling up with the gasholder by means of flexible tubing, the difficulty of frost-bound holders was overcome.

Mr. Hardie thanked the members for the reception they had given to his paper. Regarding Mr. Tobey's query, he knew that some people had doubt whether gas mains, as well as other mains, were broken by frost; and he suggested that the pipes were broken previously, but that the fractures were not discovered until the frost hardened the ground and prevented the gas getting away, as it usually did, through the soil. But he (Mr. Hardie) was inclined to think that the pipes were broken by the frost, and probably the reason was that the ground was so hard that the pipe, upon contraction, could not get vent, as it would do if the ground were more pliable. So it broke. As regarded the matter of the condensers, he did not suggest anything, practically, more than that he thought it was a pity to reduce the gas to a temperature lower than, perhaps, about 60° F. People had suffered by having the scrubbers thrown out of gear for a considerable time, which he could only consider was owing to the gas or the water being supplied to them at too low a temperature.

The President proposed a vote of thanks to Mr. Hardie for his emi-

nently practical paper. One point struck him as being interesting from a chemical and technical point of view—the clause in which the author stated that, when the gas was denuded of moisture, there was no deposition other than that of some of the light hydrocarbons. That should, he thought, give some encouragement to his friend Mr. Bower, who expressed some doubt as to the carrying capacity of benzol. He should liked to have asked Mr. Hardie whether, if they cooled the gas sufficiently before they passed it to the subsequent plant for the recovery of ammonia and other residuals, they would get any naphthaline after that. It seemed to him that the remedy was in their own hands. If they once lowered the temperature of the gas down to any temperature to which it would ultimately be exposed, they would have no naphthaline in their mains. But the remedy was, of course, benzol.

Mr. Lees seconded the vote of thanks to Mr. Hardie for his paper, which was agreed to.

[Translated from *Revue Industrielle*, by Mr. Herman Poole.]

Experiments to Form Chemical Combinations with Argon.

By M. Berthelot.

We mentioned previously that M. Berthelot had received some argon from Mr. W. Ramsay. The gas was contained in a tube arranged for spectrum analysis, and in a small balloon, or, rather, cylinder, terminated by points sealed by fusion. Mr. Ramsay stated that the gas had been treated in an apparatus arranged for the absorption of nitrogen till all the bands due to that gas had disappeared and there was no more absorption perceptible. The density of this specimen is 19.95 (H = 1), and the ratio in specific heat, 1.64. It was with this sample, guaranteed by Mr. Ramsay, that Mr. Berthelot made the following experiments. The gas contained in the cylinder was drawn out by immersion in a mercury tank, breaking the two points successively, and collecting the gas directly in a small measuring tube. Its volume was .37 cubic centimeters (2¼ cubic inches)

Berthelot tried to bring about combination of the argon with other elements by means of an electric slow discharge, which is much more efficient than the spark, since it conserves the permanency of unstable combinations better, the action developed by the discharge being too rapid to give place to the final destruction of those products due to a continual raising of temperature, which is just the opposite in case of the spark. Nitrogen, for example, in the presence of hydrocarbon gases or vapors, gives birth to the most varied products of condensation under the influence of the slow discharge—products which decompose on elevation of temperature; while under the influence of the spark only one single combination is formed—cyanhydric acid; and were this last not stable at a high temperature, we would get nothing. Carbonic oxide condenses under influence of the discharge, but seems very little altered in that of the spark. In the same way the discharge, acting on a mixture of nitrogen and hydrogen, is susceptible of producing quite a percentage of ammonia, while with the spark only, an infinitesimal quantity is allowed to remain. Under the influence of the discharge, nitrogen is absorbed by water, with formation of ammonium nitrite, a compound which gradually and spontaneously decomposes at ordinary temperatures.

It occurred, then, to try the effect of treating the gas with hydrocarbons instead of oxygen, hydrogen, etc. As the quantity of gas disposable was small, Berthelot tried, first, the hydrocarbon compounds, which are favorable to this kind of experiments.

He submitted the argon to the electric action under conditions of silent discharge with variable potential, regulated by a Ruhmkorff apparatus, with vibrating interrupter and high tension. The apparatus employed permitted gradual discharge and exact measurements. Under these conditions, Berthelot has succeeded in producing a rapid absorption of free nitrogen by means of hydrocarbons, carbol hydrates and the most varied organic matter.

Argon likewise is absorbed, it seems, although with more difficulty. Benzine vapor was tried first, since its presence is very efficacious with nitrogen. The action of the discharge on this mixture is accompanied by a faint violet glow, visible in the dark. During one out of five experiments, after a while, there was produced a magnificent greenish light, with a peculiar spectrum; but the quantity disposable was too small to permit seeking the circumstances which gave rise to these effects.

The data of a methodic experiment made with about .6 cubic inch of argon: One hundred volumes of the gas furnished by Mr. Ramsay was measured and put in contact with a few drops of benzine, which increased the volume of the gas about one-twentieth. It was then introduced into a silent discharge tube passing through a small quantity of the liquid. Electricity was then passed through it at a moderate tension for six hours. The gaseous volume was reduced about one-tenth. The vapor of benzine was then absorbed by a drop of concentrated sulphuric acid, using the usual precautions, and the residue measured. It was reduced to 89 volumes; an 11 per cent. reduction.

To this volume was again added some benzine vapor and the experiment repeated, only using much higher tension current. The volume diminished more rapidly than before. In about three hours, all reductions made, the volume was only 64 per cent.; that is to say, it has undergone a new reduction of 25 per cent.

What remained was again admixed with benzine and submitted to still higher tension for several hours. A still further reduction was accomplished, and a final residue of three volumes obtained. But this residue was not pure argon. It contained nearly one-half combustible gas produced by the action of the electricity on the benzine. On eudiometric analysis these 32 volumes contained:

Hydrogen	13.5
Benzine vapor	1.5
Argon	17.0

There was no alkaline vapor present.

So that, out of 100 volumes of argon, the benzine vapor had successively condensed .83 to a state of chemical union, produced under influence of the electric discharge, which is five-sixths of the total amount. The dimensions of the apparatus would not permit going further with it.

The products of this combustion represented a weight too small to permit a thorough examination. They were comparable to those produced by the same electric action on nitrogen and benzine, *i. e.*, they consisted of a yellow, resinous, odoriferous matter, condensed on the surface of the two glass tubes between which the electric action was exerted. This matter, submitted to action of heat, decomposed, forming volatile products and a very abundant carbonaceous residue. The volatile products turned litmus paper blue, showing the formation of an alkali during the decomposition. But it was not possible to study more deeply on account of the small amount. In every case the conditions under which argon is condensed by hydrocarbons prove more completely the relation to nitrogen.

Let us notice here that if we are allowed to use 42 instead of 40, the molecular weight of argon, which is within the limit of error in the experiments made so far, among which has been obtained one of 41.2, the weight would represent 1½ times that of nitrogen, *i. e.*, argon would bear the same relation to nitrogen that ozone does to ordinary oxygen. There is, however, this fundamental difference, that argon and nitrogen cannot be transformed into each other yet, no more than can the isomeric or polymeric metals.

However, the inactivity of argon ceases under the conditions described. When much larger quantities of argon shall be at our disposal, it will be easy, without doubt, to make these primary combinations, or analogous ones, with oxygen, hydrogen, or water, as starting points for the transformations, and to obtain the normal series of more simple compounds. There will be an equal opportunity for research for argon and its combinations in organized bodies.

The Governing of Steam Engines.

Mr. G. L. Addenbrooke, in the London *Electrician*, gives the details of some experiments on the engines of an electrical plant in India for which he was the consulting engineer.

The plant consisted of three 40-kw. dynamos, coupled direct to Belliss compound engines; the boiler pressure was 120 pounds, and the speed was to be under 525 revolutions full load; the dynamos were fully compounded. The compounding having been adjusted on the first set, and trials of this and the second set having established the characteristics and working of the plant, advantage was taken of the trial run of the third set to make the experiments on the governing and control of the engine, after the plant had run for about four hours at full load, viz., 100 volts, 100 amperes and 500 revolutions. The experiments were as follows:

1. The whole current was suddenly switched off, leaving no load on the engine. The speed at once went up to something over 600 (the tachometer was not calibrated further), but within a second it was reduced to 575, and after two more oscillations of rapidly decreasing amplitude, and taking only a few seconds, the engine settled down to run steadily at a speed of not more than 1 per cent. difference from the full load rate. This was repeated, and the current then switched on.

2. The governor (of the throttle valve type) was kept full open, and the speed run up to 575 revolutions, when the dynamo gave 403 amperes

at 118 volts. The engine was then doing 18 per cent. more than its proper load, or about 80-horse power. It still ran quietly, and the governor seemed to have proper control over it.

3. An attempt was next made to ascertain the sensitiveness of the governor to slight differences of adjustment, which are obtained by means of a small hand wheel working on a screw; this alters the tension of a spring, the latter balancing the thrust of the governors, the action of which opens or closes a sensitive throttle valve arranged in the main steam pipe.

In the first pace, the load was reduced to a quarter, and when everything was running steadily, a complete turn of the governor adjusting wheel was made. The result was to reduce the revolutions about 12, and to bring down the voltage 3 per cent. Under the same circumstances, a half turn made about five revolutions difference in speed. The difference made by ¼ inch of a turn was not sufficiently decided to be observed, but a ½-inch turn was; and it was clear that the voltage could easily be regulated within less than 1 per cent., or a ¼-inch turn, by means of the governor. In the next place, the full load was put on, and the above experiments repeated, to see if the governor was as sensitive at full as at one-quarter load. Under these circumstances a whole turn of the governor adjustment wheel reduced the revolutions by 14, and the voltage in two trials, both up and down, was increased and decreased by 3 per cent., in accordance with the direction in which the turn was taken.

4. The plant running full load, by rotating the adjusting wheel the speed was lowered 20 and 30 per cent. while the engine was running, and afterwards brought up again to the normal.

Of course, in trials like these, involving small differences, slight alterations of pressure in the boiler, the cooling and heating of resistances, and other matters, a very high degree of percentage accuracy is only attainable by extreme care and careful preparation. But the above results are sufficiently accurate for all practical purposes, and the observations left the impression that, if possible, even better could have been done after the the engine had had two or three weeks' constant work, and all the working parts had become properly polished.

It is worthy of note that the engine which indicated 65-horse power during the trials, was placed on a platform, and was not bolted down—simply standing on its own extended bedplate.

Mr. Addenbrooke concludes that the makers have certainly used great care and skill in working out their engine, with the most excellent results. His account of these trials. he states, is not to eulogize the engine beyond expressing a high opinion of it, nor does he suppose that they are unique in their method of governing. The object has been to show that engines can be made to govern, and with provision for altering the adjustment of the governor or the speed of the engine, over the full range required for central station or similar electric work; and that the governor can also be made sensitive enough to enable sufficiently accurate increments or decrements of voltage to be provided for by adjustment of the governor, and thus that it is thoroughly practical to provide the voltage required in the omnibus bars and in the circuits by adjustment of the engine, leaving the switchboard attendant to his proper duty of observing the voltage in the feeders and at the feeding points or transformer stations, which he is then in a better position to keep at the requisite pressure than if he had to look after the adjustment of exciting resistances also.

Durability of Pigments Derived from Coal Tar Products.

At a session of the Society of Chemical Industry (London), the matter named in the heading formed the topic for discussion. Mr. A. P. Laurie, M.A., contributed some notes, in which he said the method has been to grind a little of the pigment into a stiff paste with water, and then to dilute with more water and a few drops of a strong solution of pure gum arabic. This dilution was practically the same in each case, and was so adjusted that, on stirring up the diluted pigment, which was kept in a corked bottle, and then laying on a wash with a soft camel-hair brush, I should get a tint of the depth required. These washes of color were laid upon Whatman paper in five coats, each coat covering less of the surface than the one laid on before, so that at the end, on the top of my strip of paper, I had a layer of color five coats thick, and a series of coats lying in steps down the paper, till at the bottom I had only one coat of color. These washes were so regulated in strength that they were not so weak as to make one and two indistinct, and not so strong as to make five and four indistinct. In practice, I get in this way coats closely corresponding for different pigments in the strength of coloring effect that they represent, and while this is, of course, far from a perfect method, it yields results which are sufficiently good for practical purposes.

In practice I cut a little portion from the top of my washes of the pigments, and attached it with a piece of gum paper to a sheet of glass which was fixed to a window with a north exposure.

To summarize, I can say that alizarin and its derivatives and gallo-flavine form remarkably durable lakes; that some eosine lakes, naphthaline, scarlet and erythrene come next; that after these comes crimson lake; that next to crimson lake comes acid green, while among the very fugitive colors we must place methylene blues, methyl violets, brilliant green and some eosine lakes.

In some cases colors quickly change in tint, but do not necessarily fade rapidly. This is probably the worst fault a color can possibly have.

Mr. R. J. Friswell said it was impossible to draw an inference from the behavior of a particular dye when used in one way as to how it would behave when used in another. For instance, eosine, when dyed upon wool or cotton, was one of the most fugitive of the aniline colors, yet if it were precipitated on baryta or lead bases in the proper manner, it was one of the most permanent. As a manufacturer of dyes, he was interested in their permanence when applied to fabrics or yarns. He had come to the conclusion that no law could be laid down that a particular color was fugitive or non-fugitive *sui generis*. All experiments showed this to be absolutely impossible. The permanence of a color was a function of the color itself plus the substance with which it was combined. That was shown by the behavior of colors of the methyl violet, brilliant green, and malachite green series when dyed upon starch. The speaker instanced some tubes of starch dyed with 1 per cent. of methyl violet and brilliant green. These tubes were prepared about 10 years ago, and after being shown for months in an exhibition in East London, had been exposed to sun and light for years, but were still absolutely unchanged. Had wool or cotton been used, the color would have disappeared in a few months. To obtain reliable results, Mr. Laurie should obtain colors the genuineness of which could be certified, and should himself prepare the lakes to be experimented with. He would caution the author against being misled upon one point. If he dyed two parts of color upon 50 grammes of barium sulphate and then mixed it with another 50 grammes of barium sulphate undyed, and compared this with another 100 grammes dyed with 2 per cent., the two might, owing to the imperfection of human vision, appear to have the same tint. But as a matter of fact, he would have double the amount of color undergoing the action of light in the one case, just as a double depth of solution gave double absorption in the spectrum of the colors. The slowness of some colors to fade might be accounted for by their producing dark-colored decomposition products on the surface, which had a protective action on the color beneath.

The Manufacture of Carbon for Electrical Purposes.

United States Letters Patent were issued early this month to Messrs. C. P. Shrewsbury and J. L. Dobell, of Medbury, England, on improvements in the manufacture from carbonaceous materials of plates, slabs, pencils and other articles for electrical and other purposes.

The invention consists in the production of a compound which, when subjected to the different processes of treatment, can be given different properties; according to one process a carbon insulator is produced and by another a material equal or superior in conductivity to graphite, but costing considerably less.

The compound consists of anthracite coal, bituminous coal and pitch or tar, or both; the articles which are formed from this mixture are submitted to pressure, and gradual baking concludes the process. The anthracite coal and bituminous coal are first reduced to a fine state of division and then placed in a suitable mixing machine in the proportions by weight of anthracite coal 10 parts and bituminous coal 4 parts. After having been thoroughly mixed, a considerable quantity of tar or pitch, or both, is added, such quantity being varied according to the caking quality of the bituminous coal and the degree of pressure to be employed in forming the material into the required shape. If the bituminous coal be of good caking quality, about 7 parts by weight of the above may be added, and a light pressure not exceeding 20 pounds to the square inch applied. As the pressure is increased the amount of tar, etc., is less.

When the material is moulded under pressure not exceeding 20 pounds per square inch, it is not sufficiently condensed to retain its form during the baking process if removed from the moulds previous to being placed in the oven; it is therefore baked in the moulds, after

which it is removed, and, if required to have a high electrical resistance, the article is ready for use; if, on the contrary, it is required to have a low resistance, another baking at a higher temperature is necessary.

If it is desired to produce a plate or other article to be employed as an electrical insulator, the maximum temperature must not exceed 1,450° F.; if it is to possess a high electrical resistance, the temperature must be above 1,450°, and must not exceed about 1,500°. If required for Leclanche or Bunsen batteries, the temperature must be above 1,600° F. In all cases the oven is allowed to remain at the maximum temperature for a period of about 4 hours. If the articles are required to be of low electrical resistance, such as that of carbon plates employed for electrolysis, or are to be subjected to a high temperature, the oven temperature should be raised to from about 1,600° to 1,800° F. After the articles are removed from the moulds they are placed in tiers in an oven with ashes between and surrounding them, and the temperature gradually raised to 2,500°, and maintained at the maximum temperature about 4 hours, after which the oven is allowed to gradually cool. If, however, the material in the moulds be subjected to a pressure of 300 pounds or upward per square inch, the moulded articles before being placed in the oven may be removed from the moulds and placed in a drying chamber or dried by exposure to a dry atmosphere, after which, if the article is to be of low electrical resistance, the baking may be effected by one operation.

A New Feature in Prepayment Meters.

The London *Journal* has this to say about improvements in prepayment meters:

Of the patenting of automatic prepayment gas meters there is no surcease, and a respectable selection of these interesting appliances are actually upon the market. As specimens of these most ingeniously constructed articles are brought under notice one after another, and the manifold excellencies and safeguards pointed out by the proud proprietors, we are moved to esteem everyone cleverer than the rest, and to think of the last and newest that surely the culminating point of certainty, adaptability and security has in it been attained. We refrain from confessing how often this latter conviction has been forced upon us, but it happened again last week, when we had an opportunity of inspecting the specialty of the National Meter Company, Limited, which is the happy result of the inventive labors of several partner patentees. The time has come now when the introducers of yet another penny-in-the-slot meter can fairly be asked whether there are any special points about their production, or whether it is a mere manufacturer's device for "keeping up with the procession" of the trade, which now includes an automatic prepayment meter attachment among those business necessaries which no "live" firm can afford to be without. There are in mechanics usually so many different ways to be made out for doing the same thing, that various parties can cultivate methods of their own without necessarily interfering with one another. The time soon arrives, however, when patentees discover that there is no further demand for appliances which are no better than, but only different from other arrangements having the same object; and this is emphatically the case in regard to automatic prepayment meters.

In the instance of the National Meter Company's specialty, the first thing to strike on is that, besides being a penny-in-the-slot meter, it is a half-penny-in-the-slot meter also; duly measuring out for the smaller copper coin exactly one-half of the quantity of gas purchasable by the larger circulating medium. This may appear at first sight a small matter; but it really is a consideration competent to turn the scale in favor of the meter possessing it, as compared with others equally good in other respects, but of less accommodating appetite. For, after all, people who are in the habit of making their purchases for copper, or, as the police more correctly have it, "bronze coins" of the realm, carry both pence and halfpence; and it is apt to irritate anyone to find that a mere mechanical appliance refuses, unlike any other chandler, to take two halfpennies as the equivalent of a penny, or to sell a ha'porth to a poor man who for the nonce has no other money in his pocket. Wherefore we regard the National Meter Company as having distinctly scored with their penny and halfpenny receiving mechanism. And there is more in the elasticity of the arrangement than this; for by a very simple modification, the same principle can be adopted to work with shillings and sixpences. Further than this it seems impossible to go at present with English coins, for the sufficient reason that the current florin and penny are so nearly of a size that the machine could not discriminate between them. For any currency, however, presenting a marked graduation of size from the dollar downwards, there would be no difficulty in so adapting the meter under notice, as to enable consumers to pay for gas with any coin they happened to have in hand at the moment.

In this meter, the prepayment mechanism is conveniently placed in front, without adding to the height, or interfering in any sense with the pipe connections. At the bottom is the money-box, which is of considerable capacity, and the ordinary index is not touched by the prepayment attachment. Mounted horizontally over the ordinary index, there appears in view the front edge of a porcelain ring 3 inches in diameter, bearing 200 separate divisions in plain black lines, each division representing a cubic foot of gas. The consumer helps himself to gas by turning, through an eighth of a circle, a milled brass knob, which reveals a slot, into which he drops his penny, and turns the knob back again. By the same movement, the penny is released, and falls into the cash box, and the porcelain ring turns from right to left, a fixed pointer in the front showing how far it has turned, and indicating the number of feet of gas purchased by the transaction. This ring is attached directly by a rod to an inlet valve, and, by means of a rod and pinion geared to the crank-shaft of the meter, is revolved in the reverse direction to that given to it by the penny—that is, it returns toward its zero point with every cubic foot of gas burnt, the exact state of the account being always visible at a glance on the wheel.

Any error of adjustment of quantity to price is apparent at once when the meter is set, and can be rectified immediately. The adjustment mechanism is so sensitive as to permit of the most minute change, which is effected by means of a milled headed screw. Two hundred cubic feet of gas may be prepurchased, but it is only the first coin, and the last few feet of gas, which have any effect upon the valve. The first coin opens it to the full extent, when it becomes disconnected with the rest of the mechanism (thus preventing risk of premature closing) until the allotted quantity of gas is nearly consumed, when it again comes into operation and gradually closes. The valve is made wholly of incorrodible metal, and it is subjected to three influences tending to keep it shut—its own weight, the motion imparted by the meter, and the gas pressure—so that it is next to impossible for it to fail or get out of order. But supposing the worst to happen, and the valve to fail of its duty, the extra quantity of gas passed would appear in evidence, not only on the ordinary index, but also on the prepayment indicator, and would be automatically deducted from the next purchase.

Another feature of this meter is the precaution taken to prevent jamming by the careless insertion of a second coin in the slot before the first has been cleared. This is done very simply, by making the coin instantaneously close and lock the slot over itself until it has been discharged. The same stop comes into play when 200 cubic feet of gas have been prepurchased, thereby preventing the insertion of another coin until at least one pennyworth has been consumed. The last, but not least, point to be noticed is the very simple and strong character of the prepayment attachment and gear. As already remarked, it has no connection with the ordinary meter index, and however roughly the coin-receiving mechanism may be handled, no strain can come upon the internal fittings. Every part is made to gauge, and is interchangeable; and the whole thing can be taken away by turning a screw, when the meter can be used as an ordinary gas measuring instrument.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE inhabitants of Westwood, a suburb of Cincinnati, O., are desirous of having their streets lighted by gas, and with that end in view have asked the Cincinnati Gas Light and Coke Company to extend its mains through the Westwood district.

AT the annual meeting of the Cincinnati Gas Light and Coke Company the annual reports were received with satisfaction by the shareholders, but it was decided not to give out the details of same for publication. The Directors chosen were: A. Hickenlooper, Robert Allison, J. H. Bates, W. A. Goodman, A. Howard Hinkle, Chas. Fleischmann and George N. Stone.

THE Hartford Dredging Company is deepening the channel in front of the docks of the New Haven (Conn.) Gas Light Company.

THE proprietors of the new Gas Company for Belvidere (Ills.) are experiencing much difficulty in securing a site for the works. Perhaps we should have said opposition, for while eligible sites are many the opposition of those already in business near the sites spoken of and negotiated for is quite pronounced.

THE additions to the plant of the Westminster Paper Company, Bellows Falls, Vt., are completed. The new machine room is 40 feet wide

and 185 feet in length, and is covered with one of the Berlin Iron Bridge Company's patent anti-condensation corrugated steel roofs.

THE proprietors of the Tacoma (Wash.) Gas and Electric Light Company recently published the following notice in the local papers: "Having purchased the gas works of the Tacoma Light and Water Company, it is our intention to add extensive improvements which will enable us to furnish the public with gas of a superior quality and at reduced rates. From and after May 1st our prices will be as follows: For illumination, $2 per 1,000 cubic feet; for fuel, $1.75 per 1,000 cubic feet. We have secured the rights for this city of the Welsbach incandescent gas light, which exceeds in brilliancy (and burns less gas than) any other burner in use. With the aid of this burner, and the reduction in the price of gas, we are able to give the public a better and cheaper light than can be obtained by any other means. We have also purchased over 200 cooking stoves at a remarkably low price, which we now offer to set up ready for use at their actual cost to us. The prices are over 50 per cent. less than they were ever sold for, either in Tacoma or any Eastern city. These stoves were consigned to our predecessors, and the manufacturer accepted our low cash offer rather than pay the freight back to their Eastern factory. We have in press a pamphlet describing our stoves and giving many testimonials from consumers of gas for cooking, which will be placed in your hands in about two weeks. It is our desire and intention to give good service, and we request that complaints be made when anything is unsatisfactory, and they shall have our prompt attention."

THE annual meeting of the Bangor (Me.) Gas Light Company resulted in the election of the following officers: Directors, T. U. Coe, Willard Cutter, A. C. Hamlin (who replaces Mr. F. A. Wilson), C. P. Stetson and J. F. Colby; President, T. U. Coe; Treasurer, George A. Crosby; Clerk, C. M. Griffin; Superintendent, A. H. Parker. President Coe says there has been a steady increase in the use of gas in Bangor for the past 10 years, and the year just closed, despite the dullness of the times, has been no exception. Gas stoves for cooking are rapidly finding favor, and the people who use them have no complaint to make about them, either in point of efficiency or economy.

THE sub-committee of the Gas Committee of Philadelphia City Councils, appointed for the ensuing year, to have supervision of the city gas works, has the following *personnel:* Messrs. Firth (Chairman), W. A. Miller, Clay, Simon, J. H. Brown, Upperman, Irvine, Adams, Showaker and Short.

THE death of Mr. John Bowker occurred at Manayunk, Pa., some days ago. Deceased, who was in his 73d year, was Superintendent of the Manayunk gas works, from 1861 to 1866.

THE San Francisco Gas Light Company has issued a notice that, where a meter shows no consumption for a period of 30 days, the user, if he desires to retain it on his premises, shall be obliged to pay to the Company the sum of 50 cents per month. President Crockett, in explaining this action, says: "There are many large establishments in the city which are fitted with appliances for both gas and electric lighting. Realizing the possibility of the electric current failing them at times, they desire to maintain the gas service also, to fall back on. The meters, therefore, remain in their buildings, but for months, as often happens, not a bit of gas is used. The regular inspections have to be made nevertheless, and the Company is put to the same expense for wages that it would be were gas used altogether in the large buildings referred to. What makes the matter worse is the fact that in many of the large buildings there are two or three meters, and, besides the time and labor required for monthly inspection, the aggregate value of the unused apparatus represents a large amount of idle capital. All things considered, it must be apparent that such a condition of things as I have referred to is anything but fair to a gas company. It has been decided, therefore, to fix a trifling monthly charge for the maintenance of the meters, the figure being placed so low that no one will be likely to object to it. Of course, where people are using any gas at all the new regulation cuts no figure whatever, and in other cases, where the meters are desired simply as a precaution, the convenience is certainly worth 50 cents a month. There is, it is unnecessary to state, no compulsion upon anyone to pay the charge, since, if he so desires, he has only to notify the Company to have the meter removed."

THE annual meeting of the Easton (Pa.) Gas Company was a harmonious happening, and the shareholders had plenty of reason for congratulating themselves, for the sales of gas were well increased over the preceding twelvemonth. The Directors (to serve three years) chosen were: William A. Bush, E. A. Depew and William G. Stewart. The Directors subsequently completed the following organization: President, Samuel Boileau; Secretary, William G. Stewart; Treasurer, E. S. Lawall; Superintendent, Wm. H. Ward.

IT is evident that Col. Richardson's trip South this Spring did not render him any the less business like, judging from the following mention which we take from a recent issue of the North Adams (Mass.) *Transcript:* "Col. F. S. Richardson, Treasurer of the North Adams Gas Light Company, has a pleasing announcement to make to the patrons of the Company in the way of a reduction in the price of gas, to take effect July 1st. The new rates and reduction will be as follows: To those using 25,000 cubic feet per month or less, $1.75, instead of $1.85; to those using more than 25,000 cubic feet per month, $1.50 instead of $1.60; and the low price of $1.40 per 1,000 for use in mechanical processes is to be maintained for the encouragement of the use of gas in engines, ranges, etc., for which the Company offers special service and accommodations. The price of electric lighting and electric power is to be reduced in proportion with the reduction in gas rates. This reduction is purely voluntary on the part of the Company, and is in keeping with the past policy of the shareholders and officers, which is—no increase of dividends and a steady reduction of prices as production will allow. This is the sixth reduction in the price of gas since Col. Richardson was associated with the Company 11 years ago, when the round price was $3, and all reductions have been unsolicited. For this fairness in dealing with its customers the Gas Company deserves the thanks and favors of the public. And not only is the public favored by liberal dealing on the Company's part, but it is also fortunate in a management that can keep the price of gas below that of other towns of the same size. About 22,000,000 cubic feet of gas is manufactured and consumed in North Adams each year. To attempt to compute the loss of revenue to the Company through this reduction, by finding how much it would amount to on the number of feet given, would lead to an erroneous conclusion; for, while it would give nearly the loss on the amount of gas made, the computation not including the electricity generated and used for commercial lighting purposes, the result would not be accurate. There are a few less than 1,000 consumers, and the saving to them through this reduction amounts to several hundred dollars monthly."

THE Pelham (N. Y.) Gas Light Company, which is owned by the American Gas Company, of Philadelphia, has just closed contracts with Pelham Manor, Pelham Heights and the B. F. Corlies Park, for the public lighting thereof by gas. The district, which lies between Mount Vernon and New Rochelle, will at once be thoroughly piped. The agreements are to run for five years, and we have not been informed as to the rates or the lighting schedule.

AT the annual meeting of the South Side Gas Company, of Pittsburgh, Pa., the officers chosen were: Directors, George Trautman, Martin Maloney, Samuel T. Bodine, William A. Heyl, Joseph G. Walter, Remsen V. Messler and Robt. B. Brown; President, George Trautman; Secretary and Treasurer, William H. Alldred. It was also determined to extend the main system into and through the outlying sections of the West End, included in which are Mount Washington, Duquesne Heights, Knoxville, Beltzhoover and Allentown. This means the placing of about 10 miles of pipe.

THE Salem (Mass.) Gas Light Company has wisely determined to house itself suitably, so far as permanent office quarters are concerned, and with that end in view has rented the entire first floor of the Museum Building. The floor is of a dimension sufficient to enable the Company to carry and display a good line of gas stoves, etc.

ON the 10th inst. the works of the Bangor (Me.) Gas Light Company were badly damaged by a fire, which started in a shed adjoining the Company's storehouse. About 500 barrels of tar and several hundred tons of coal and coke were destroyed.

A PROJECT is on foot for the establishment of a gas works at Langhorne, Pa. The incorporation papers were to be filed to-day, and the title of the concern is "The Langhorne Gas Light Company." Langhorne, which was formerly known as Attleborough, is a post borough of Bucks county, Pa., and is on the New York and Philadelphia New Line Railroad, at a point 22 miles northeast of Philadelphia. No doubt the parties behind the project have convinced themselves of the good policy of putting their money in a gas works at Langhorne, but for our part we would not be over-anxious to go along with them in the ven-

ture. The main thing in Langhorne is the Bellevue Institute, for young ladies, and the population of the place cannot exceed 1,500.

THE death of Mr. Patrick Maley, a prominent resident of Brighton, Mass., and a Director in the Brookline Gas Company, is reported. He was in his 71st year.

MR. CHARLES A. RAY, of East Providence, R. I., has agreed to drill an artesian well for the Burlington (Vt.) Gas Light Company, the bore to be 6 inches in diameter, the contractor to guarantee a flow of 10,000 gallons per day.

THE absorption of the St. John (N. B.) Gas and Electric Light Company by the St. John Street Railway Company is virtually completed.

RUMOR has been busy with the affairs of the Pawtucket (R. I.) Gas Company, the story being to the effect that a "Western syndicate" had purchased it. The officers of the Company, however, say that they do not know anything about any such sale; and they ought to know, it would seem to us.

AT the annual meeting of the Westerly (R. I.) Gas and Electric Light Company the officers elected were: Directors, Edwin Babcock, Peleg Clark, William Segar, A. L. Chester and George H. Utte; President, A. L. Chester; Secretary, Treasurer and General Manager, William Segar.

THE officers chosen to manage the affairs of the East End Gas Company, Pittsburgh, Pa., for the ensuing year are: Directors, Herbert DuPuy, Wm. H. Denniston, D. H. Hostetter, J. Z. Wainwright and James Finley; President, Wm. H. Denniston; Secretary, Orlando McElroy.

THE last bids for the public lighting of Chicago, which were opened and tabulated on the 9th inst., are as follows:

		Per Lamp per Annum.
Chicago Gas Light and Coke Co.....	7,359 lamps	$22.00
Peoples Gas Light and Coke Co.....	18,266 "	22.00
Hyde Park Gas Co.....	3,777 "	22.25
Lake Gas Co.....	2,842 "	22.50
Suburban Gas Co.....	4,192 "	23.00
Calumet Gas Co., 750 lamps, in South Chicago		20.00

The stipulation is made (save in the instance of the Calumet Company, the bid of which is "net") that a discount of $2 per lamp will be made if payments on lighting account are made within 30 days after the expiration of each quarter of the fiscal year. The following bids were submitted on account of arc lighting:

	Per Lamp per Annum.
Peoples Light and Power Co.....	$105.00
Peoples Electric Light and Power Co.....	105.00
Hyde Park Light and Power Co.....from $81 to	107.50
Mutual Electric Light Co.....	82.00

The Peoples Light and Power Company operates south of 39th street and east of State street, while the Peoples Electric Light and Power Company, which is owned by the same management, operates south of 39th street and west of State street. The Hyde Park Light and Power Company operates only in the districts of the old town of Hyde Park, and has for a competitor the Peoples Light and Power Company. The Mutual Electric Light and Power Company is located in the district south of 61st street and west of State street. The only bid for the 8,400 gasoline lamps in the city was from the Globe Light and Heat Company, which offers to do the work for $15 on its own lamps, and for $13.50 on the lamps owned by the city, which number about 4,200.

THERE is no telling how long the authorities of Montreal, Canada, can take up in studying the meaning of a proposition, for the Light Committee of the Board of Montreal has just notified the Montreal Gas Company that it is prepared to accept the proposition submitted by the latter on public lighting account as far back as July 10, 1893. The tender was: "The following is the tender of the Montreal Gas Company to light the streets, in continuation of the present contract, after May, 1895. Burners 4 feet per hour, instead of 3½ feet, as at present, and the hours of lighting to be changed to the time between sunrise and sunset, and subject to other conditions in specification, at the rate of $17 per annum. Referring to the prices proposed to be charged to the public, the Company will do in the future as they have done in the past, and reduce their prices as consumption increases, with the guarantee that, for the first five years, from May 1st, 1895, the price will not exceed $1.30 per 1,000 cubic feet, with a rebate of 10 cents per 1,000 cubic feet for prompt payment on the usual quarterly days. Second five years, the price will not exceed $1.20 per 1,000 cubic feet, with a rebate of 10 cents per 1,000 cubic feet for prompt payment on the usual quarterly days. For heating and cooking, first five years, $1 per 1,000 cubic feet, net. Second five years, 90 cents per 1,000 cubic feet, net."

AT the annual meeting of the Wilkes-Barre (Pa.) Gas Company the officers elected were: Directors, W. S. Conyngham, A. A. Sterling, Marcus Smith, J. W. Hollenback, George S. Bennett, A. H. McClintock and Levi I. Shoemaker; President, W. S. Conyngham; Vice-President and Treasurer, A. A. Sterling; Secretary and Superintendent, Marcus Smith.

THE shareholders in the Erie (Pa.) Gas Company have named the following Directors to serve for the ensuing year: C. M. Reed, G. R. Metcalf, J. S. Richards, W. S. Brown, C. Brandes and J. P. Metcalf.

THE introduction of narrow gauge railways in and about industrial establishments, and wherever material is required to be handled and moved short distances, is strongly recommended for economy and convenience, and their use is becoming daily more general. The C. W. Hunt Company, of 45 Broadway, New York City, which furnishes in its "industrial railways" the most improved machinery of this class on the market, has recently equipped the Schoen Mfg. Co., of Pittsburgh, Pa., with a complete system of track and cars.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

A Growl Against the Welsbach Company.

CAPITAL GAS AND ELECTRIC LIGHT CO.,
FRANKFORT, KY., May 7th, 1895.

To the Editor AMERICAN GAS LIGHT JOURNAL: Just at this point, when everybody is interested in the Welsbach lamp, I would like to detail, for the benefit of the rest of my "country cousins," our experience with the Welsbach Company.

About eight months since we were appointed the selling agents for the burner at this place, signing an agreement, which, by-the-way, binds everybody but the Welsbach Company, and which we have lived up to to the letter.

For no reason that we can see, except that we did not abandon our legitimate business and devote all our time to booming the burner, we are notified that we are no longer the agents, but have been succeeded by a firm of "music dealers" in an adjoining town.

At the time when we could have sold a great many burners we could not obtain them, and now that the lighting season is practically closed we are deprived of the privilege of longer handling the burner, with not a word of acknowledgement for our efforts in getting the burner established on a sound basis. The eternal salvation of the gas business may lie in the direction of the burner, but we very much doubt it.

There are disadvantages as well as advantages; the burners need more or less attention, which the Gas Company has to give gratis and which adds to the cost of operating. No other device for gas burning that has been evolved in the last 15 years has received the gratuitous advertising from the journals and the fraternity at large as the Welsbach. The policy of the Company is to force the sale of the burner at a high price, furnish poor mantles, so as to get their money out of the venture as soon as possible, and it does not take much of a prophet to predict that, unless the stability of the burner is materially added to, it will not prove the success that the more sanguine gas men are disposed to predict. This will, no doubt, recall the stock quotation, "Let the galled jade wince;" but the shield has a reverse as well as an obverse side, and since the gas business furnishes the outlet for the product of the Welsbach Company, it will strike the casual observer that gas companies are entitled to at least courteous treatment from the "Messiah, incorporated," which is to lead them out of the slough of despond into which they have fallen.

In our particular case we have made every effort to introduce the burner, and have placed them on 30 days' trial, furnishing new mantles free of charge when they were defective. In case a sale was made we allowed the consumer to add $1 per month to his gas bill, until the burner was paid for.

Having been familiar with the burner since its first introduction in America, the writer has learned from experience that, unless the burner is carefully looked after by some one interested in its success, it will be short lived in the smaller towns. This the agent who has no interest in the burner beyond the initial profit made will not and cannot afford.

If the faith of the Welsbach Company in the future of the burner is unshaken, why not operate on a careful and conservative line, resting secure in their conviction that it will eventually supersede all other forms of artificial lighting? Their attitude, however, is that of any other dealer in novelties, who pushes his invention for all it is worth, fearing that some better modification of his idea will appear, when, like Othello, his occupation will be gone. Please do not construe this as an attack upon the burner, but upon the business methods of the Company and their attitude toward the Gas Companies, without whose co-operation the life of what now seems to be an airtight monopoly will be short.

Yours truly, E. C. HATHAWAY, Supt.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR—Jos. R. Thomas, C.E.
ASST. EDITOR—T. J. Cunningham.
MANAGER—C. E. Sanderson.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 32 Pine Street, New York.

MONDAY, MAY 20, 1895.

North Carolina Coal.

Mr. A. L. Taylor, who has been investigating the coal seams in and around Egypt, N. C.—which place is on the Western Railroad of North Carolina, some 40 miles southwest of Raleigh—has this to say about them:

For over two months I have been in your chosen field of active operations, and have devoted myself exclusively to the coal resources of Chatham county, in North Carolina. Strange as it may seem, and from a geological standpoint almost inexplicable, coal exists in great abundance and of a superior quality in North Carolina. The field is limited as compared with the northern coal fields it is true, but there is enough in this field alone to last 100 years, with an annual production of 350,000 tons. This field is located at Egypt, in Chatham county, and can be easily made tributary to the Seaboard Air Line at Colon by way of the Raleigh and Western Railway, a haul of only about 8 miles, and at minimum cost of transportation.

This coal lies in a basin with an area of about 5,000 acres, and the field is controlled by the Langdon-Henszey Coal Mining Company, of Egypt. The formation lies in two strata, but in such close proximity as practically to be one stratum, at a depth of 420 feet from the surface. The first stratum is an average of 3 feet 8 inches in thickness, is highly bituminous, very free from sulphur as compared with the Illinois coals with which we are conversant, is a superior gas and coking coal, a good grate and stove coal, and an excellent steam coal if the nature of the coal is intelligently considered by the firemen who feed the furnaces. It burns freely, must be fed light and often; and really this is the true method to secure perfect combustion with any bituminous coal. When the Illinois coals were first developed on the lines of the Chicago, Rock Island and Pacific Railway the idea was scouted that the coal was fit for use, and the general consensus of opinion condemned it. It has, however, outgrown the prejudices, and to-day it may be safely regarded as the universal fuel, good enough for anybody.

Like prejudices may be encountered here, but they will surely disappear with the lapse of time. By a simple and inexpensive appliance which injects a jet of superheated air under the grate bars, this coal will do as much work, *with less ash*, than the Pocahontas, Cumberland or Tennessee coals. The second stratum is separated from this first stratum by a layer of rock about 2 feet thick, and is about 2½ feet in thickness. Both are good coals, and together give an average thickness of over 6 feet. It stocks well and does not air slack as much as other bituminous coals.

The Market for Gas Securities.

What we said six weeks ago about gas legislation in the State seems to have come to pass, for the Legislature has adjourned and the Companies of the two cities have not been instructed to cut their selling rates. Furthermore, the Wray bill (to be found in our issue for April 29th) is in the Governor's hands, and as that official is understood to favor it, it is only a question of time when it will have his signature. Under its provisions, competing companies will have a difficult task before them in gaining an entrance in the cities of New York, Brooklyn and Buffalo. We can also say we told you so in the instance of predicting the highest values ever recorded in Consolidated gas, which prediction was made as far back as April 1st. Sales were made to-day (Friday) at 145½, which is high-water mark. Other city shares are buoyant, notably Equitable, Mutual and Standard common. Nominal figures are reported in Brooklyn securities, which are all dull and strong.

Governor Altgeld's veto of the measure to hamper opposition schemes in Chicago does not seem to have permanently affected values in Chicago gas, which was traded in to-day at 75½. Baltimore Consolidated is weaker, at 60 to 61. Bay State gas is offered at 22, which does not speak greatly for the bull powers of Mr. Addicks, who is now in full swing again in Boston gas matters. Lacledes are strong, on the payment of an extra (on account of deferred payment on the preferred) dividend of 1 per cent. in addition to the regular disbursement. Western, of Milwaukee, keeps going steadily on, and the Detroit peggers have moved their specialty to "28½, bid."

Gas Stocks.

Quotations by Close & Nash, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

MAY 20.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$55,430,000	100	145	145½
Central	500,000	50	140	..
" Scrip	220,000	..	100	..
Equitable	4,000,000	100	197	..
Bonds, 6's	1,000,000	1,000	..	..
" 1st Con. 5's	2,300,000	1,000	111	112
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	164	..
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	..	..	.
Northern	150,000	50	..	..
" Bonds	150,000	1,000	..	98
New York and East River	5,000,000	100	28	30
Preferred	2,000,000	100	46	48
Bonds	3,500,000	1,000	85½	..
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	..	..	..
Standard	5,000,000	100	50	52
Preferred	5,000,000	100	99	101
Bonds, 1st Mortgage, 5's	1,500,000	..	105	..
Yonkers	.....	50	101x	..
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	125	..
Citizens	1,200,000	20	65	..
" S. F. Bonds	320,000	1,000	..	101
Equity	2,000,000	10	..	..
" Bonds	1,000,000	..	..	..
Fulton-Municipal	3,000,000	100	175	..
" Bonds	300,000	..	108	..
Peoples	1,000,000	10	90	..
" Bonds, 7's	368,000	..	100	..
" " 6's	94,000	..	98	100
Metropolitan	870,000	100	170	..
" Bonds, 5's	70,000	..	..	..
Nassau	1,000,000	25	200	..
" Ctfs	700,000	1,000	99	100
Williamsburgh	1,000,000	50	200	..
" Bonds	1,000,000	..	107	110
Out-of-Town Companies.				
Bay State	5,000,000	15	..	22
" Income Bonds	2,000,000	1,000	30	34
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	..	78
2d " " "	3,000,000	1,000	..	58
Buffalo Mutual	750,000	100	120	..
" Bonds	200,000	1,000	95	100
Chicago Gas Co.	25,000,000	100	75¼	75⅝
Chicago Gas Lt. & Coke Co.				
Guaranteed Gold Bonds	7,650,000	1,000	93	93½
Columbus	1,069,000	..	..	..
1st Mortgage	1,085,000	..	..	..
Consumers, Jersey City	2,000,000	100	72	78
" Bonds	600,000	1,000	97	100
Cincinnati G. & C. Co.	7,000,000	100	..	203¾
Consumers, Toronto	1,500,000	50	184½	187
Central, San Francisco	.....	..	90	100
Capital, Sacramento	.....	..	..	50
Consolidated, Baltimore	11,000,000	100	60	61
Mortgage, 6's	3,500,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Detroit	4,000,000	..	28½	..
" Con. Bonds	4,312,000	..	..	..
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	74½	76½
" Bonds	2,000,000	..	83¾	84
Hartford	750,000	25	120	128
Indianapolis	2,000,000	..	140	142
" Bonds, 6's	2,650,000	..	101¾	..
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	86	87
Bonds	1,000,000	1,000	85	88
Louisville	2,570,000	50	..	130
Laclede, St. Louis	7,500,000	100	29	29½
Preferred	2,500,000	100	88	89
Bonds	9,084,400	1,000	96	96½
Little Falls, N. Y.	50,000	100	..	100
Bonds	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	208
New Haven	.....	25	200	..
Oakland, Cal.	.....	..	42¾	43
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	2,100,000	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175
Paterson, N. J.	.....	25	99	102
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	81	..
Consolidated 5's	2,000,000	..	87½	90
Syracuse, N. Y.	500,000	25	..	..
San Francisco, Cal.	10,000,000	100	73⅝	73¾
Washington, D. C.	2,000,000	20	250	..
Western, Milwaukee	4,000,000	100	57	59
Bonds, 5's	3,556,000	..	85	87
Wilmington, Del.	500,000	50	188	190

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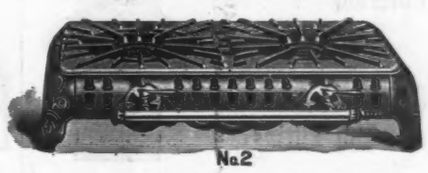
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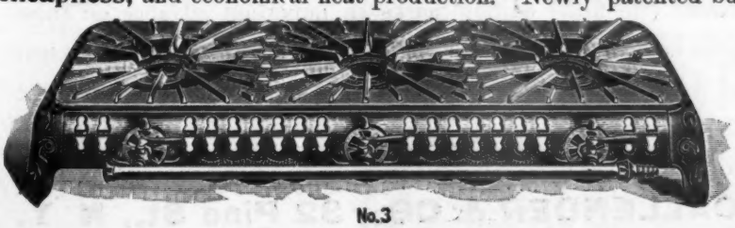
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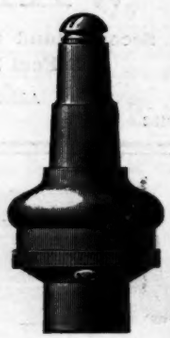

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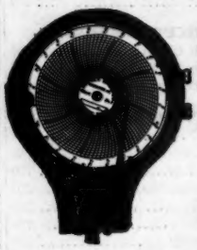

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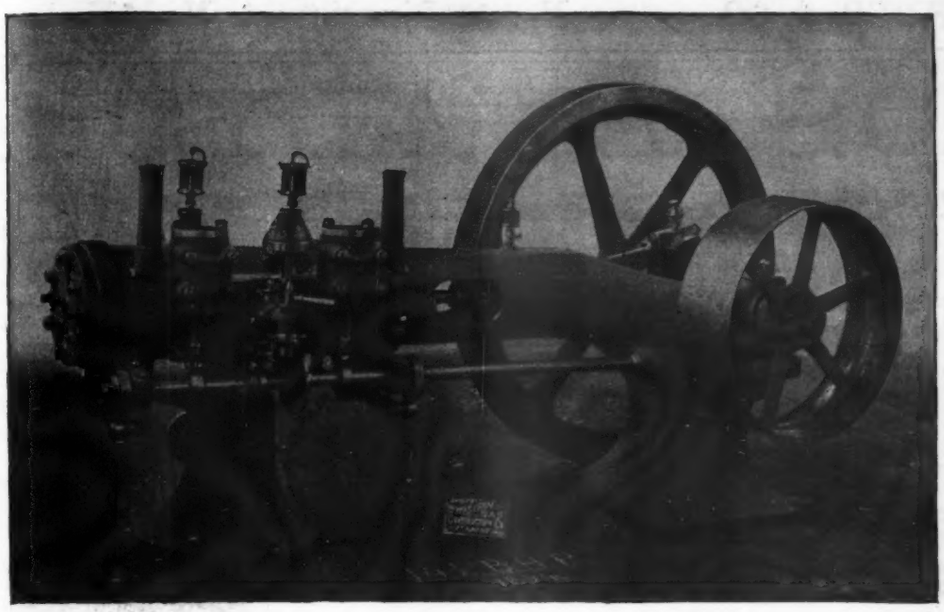

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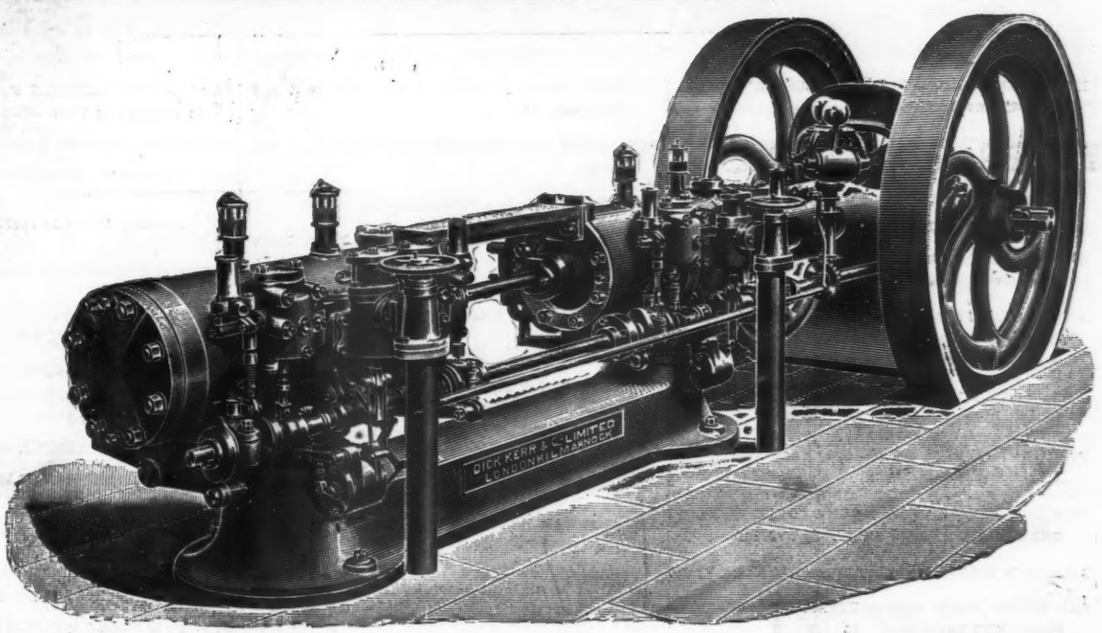

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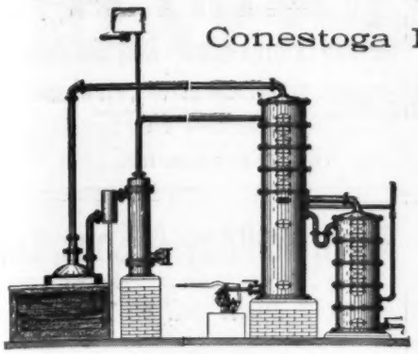

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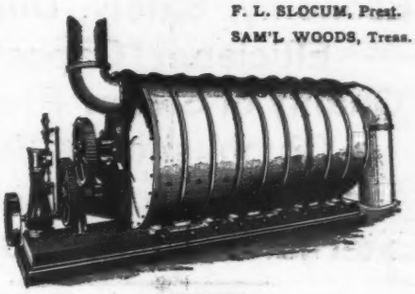

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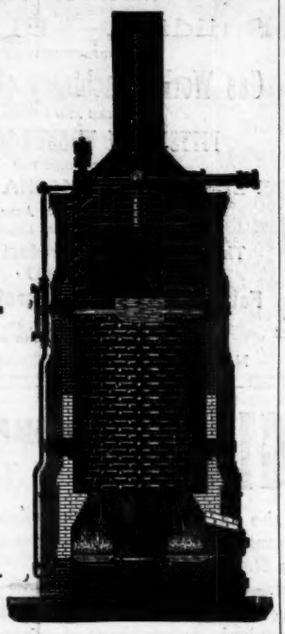

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The above illustration is taken from a photograph, and shows the Machine Room of the New Bedford Gas Co., at New Bedford, Mass. The Roof on this building was furnished by us. The building is 32 feet in width by 50 feet in length, the Roof being made entirely of iron—that is, iron trusses and iron purlins covered with corrugated iron. The room is ventilated by a wrought iron ventilator extending the full length of the building, with corrugated shutters on each side opening and closing by cords from the floor.

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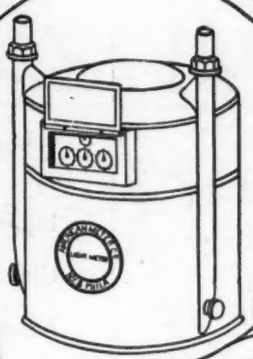

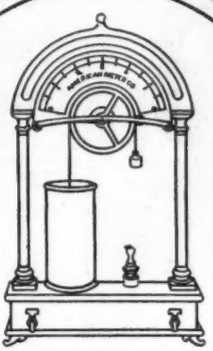

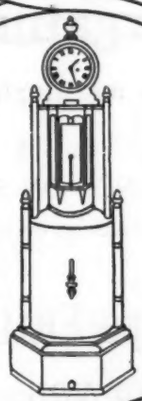

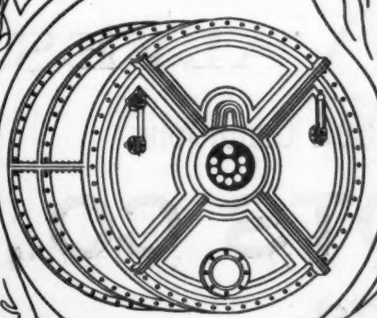

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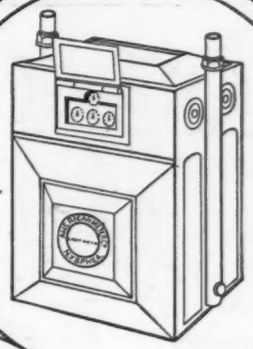

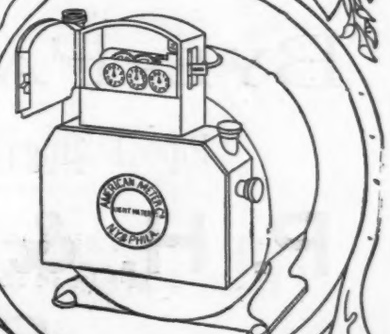

PUBLIC LIGHTING TABLE.

JUNE, 1895.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Sat.	1	12 20 AM	3.30 AM	7.15	3.15
Sun.	2	12.50	3.30	7.15	3.15
Mon.	3	1.10	3.30	7.15	3.15
Tue.	4	1.50	3 30	7.25	3.15
Wed.	5	2 20	3.30	7.25	3.15
Thu.	6	No L.	No L.	7.25	3.15
Fri.	7	No L. FM	No L.	7.25	3.15
Sat.	8	No L.	No L.	7.25	3.15
Sun.	9	8.00 PM	10.50 PM	7.25	3.15
Mon.	10	8.00	11.30	7.25	3.15
Tue.	11	8.00	12.00 AM	7.25	3.15
Wed.	12	8.00	12.20	7.25	3.15
Thu.	13	8.00	12.40	7.25	3.15
Fri.	14	8.00	1.00	7.25	3.15
Sat.	15	8.00 LQ	1.20	7.25	3.15
Sun.	16	8.00	1.40	7.25	3.15
Mon.	17	8.00	2.10	7.25	3.15
Tue.	18	8.00	2.30	7.30	3.15
Wed.	19	8.00	3.30	7.30	3.15
Thu.	20	8.00	3.30	7.30	3.15
Fri.	21	8.00	3.30	7.30	3.15
Sat.	22	8.00 NM	3.30	7.30	3.15
Sun.	23	8.00	3.30	7.30	3.15
Mon.	24	8.00	3.30	7.30	3.15
Tue.	25	8.00	3.30	7.30	3.15
Wed.	26	8.00	3.30	7.30	3.15
Thu.	27	10.10	3.30	7.30	3.15
Fri.	28	10.30	3.30	7.30	3.15
Sat.	29	10.50 FQ	3.30	7.30	3.15
Sun.	30	11.20	3.40	7.30	3.15

TOTAL HOURS LIGHTING DURING 1895.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	237.00	January	423.20
February	196.40	February	355.25
March	195.50	March	355.35
April	165.30	April	298.50
May	153.40	May	264.50
June	138.20	June	234.25
July	146.30	July	243.45
August	152.50	August	280.25
September	165.10	September	321.15
October	186.10	October	374.30
November	204.10	November	401.40
December	219.30	December	433.45
Total, yr.	2161.20	Total, yr.	3987.45

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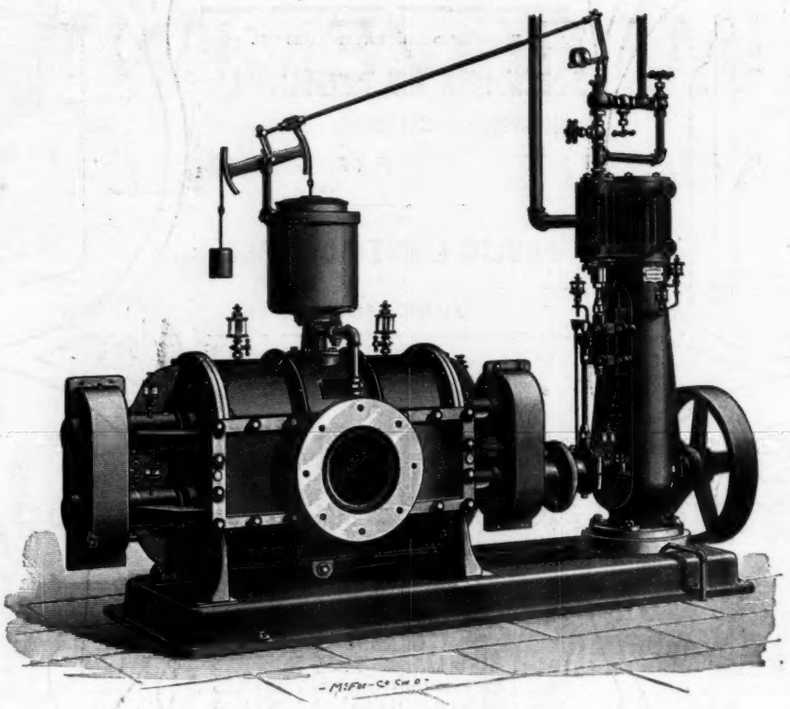
Our Latest Improved **Automatic Gas Governor** and **Steam Bye-Pass Valve** are the best in the market.



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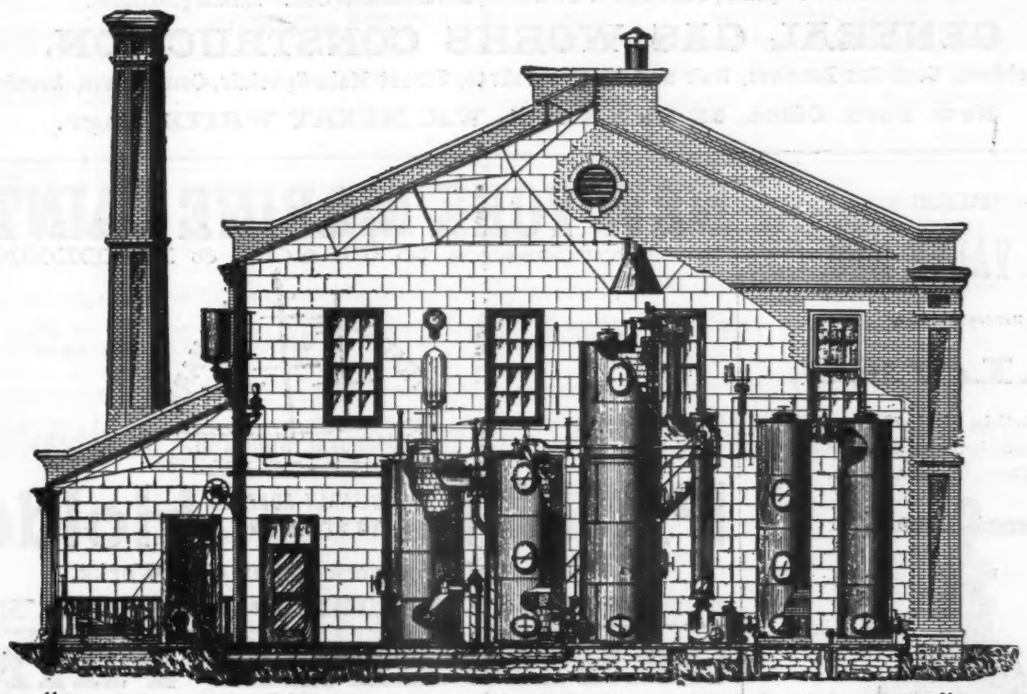

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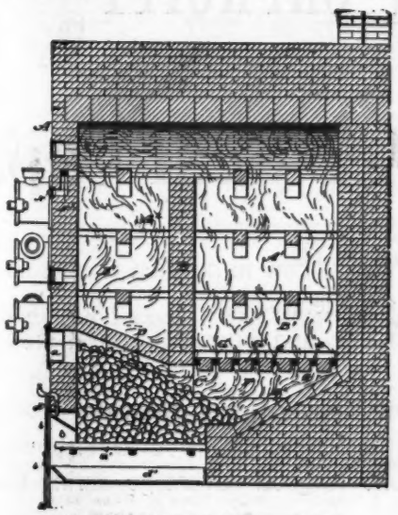

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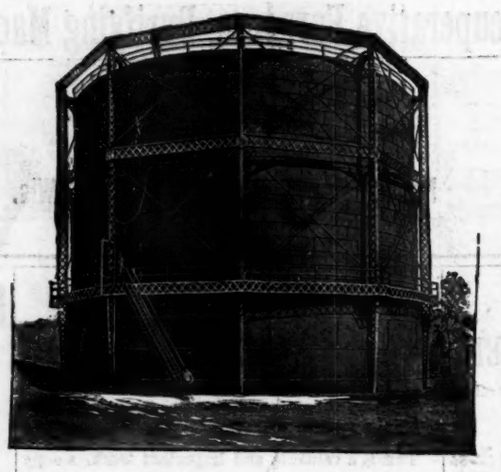

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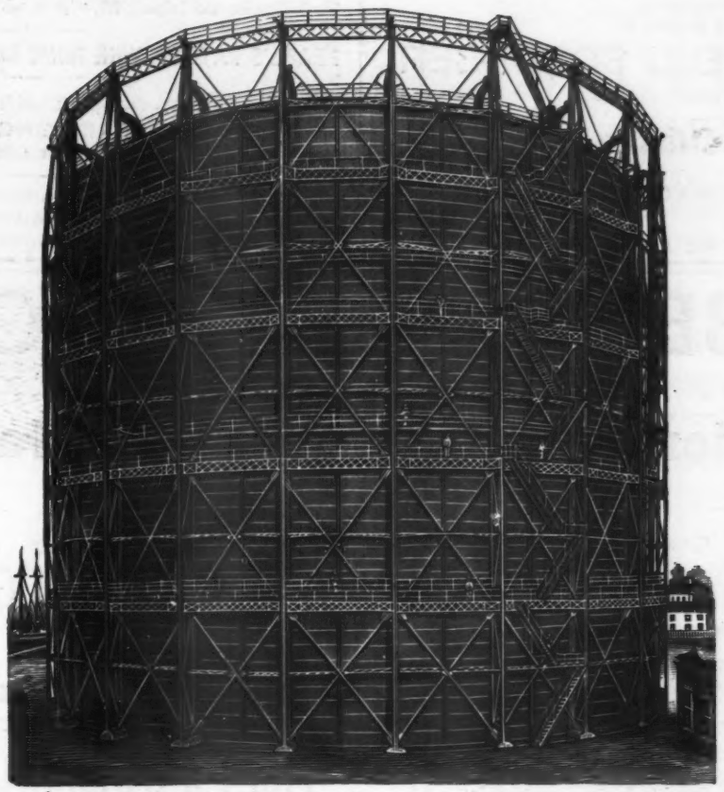

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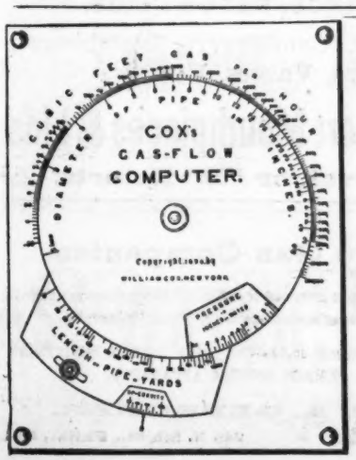

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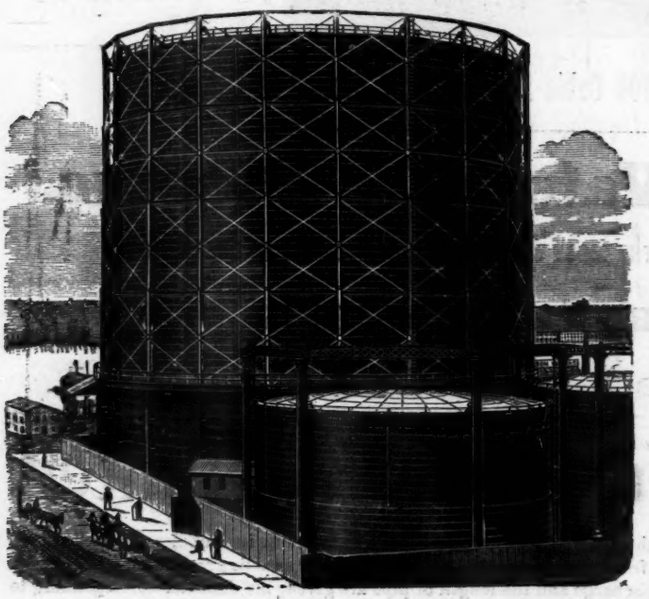

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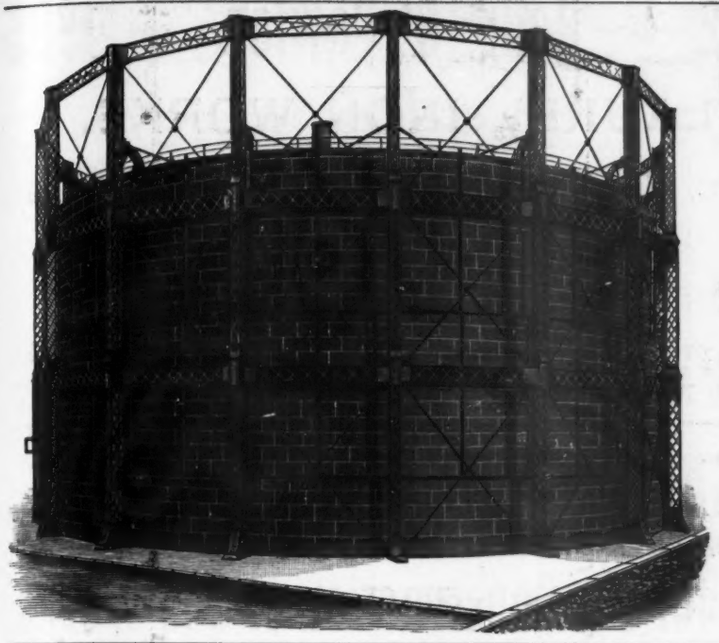

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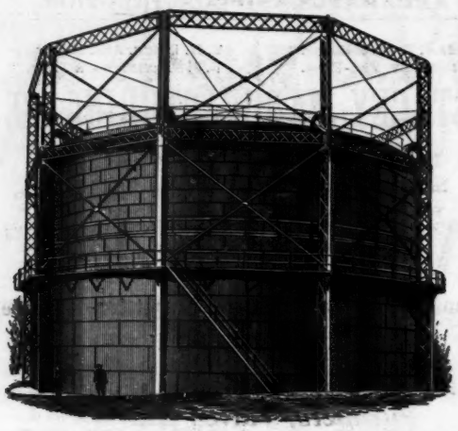

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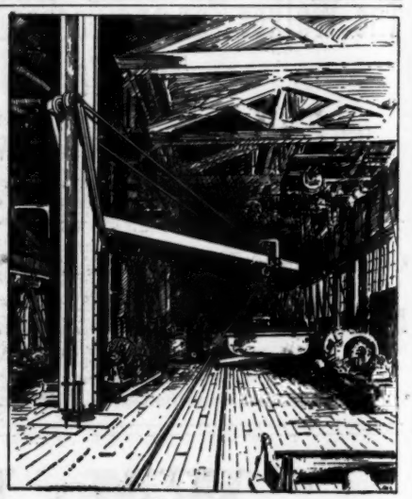

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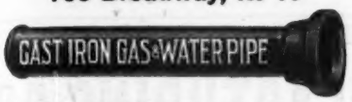

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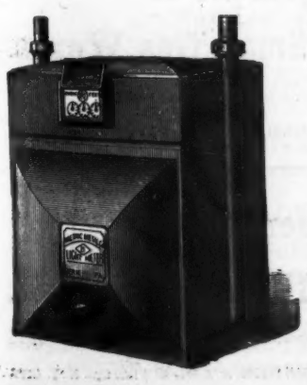

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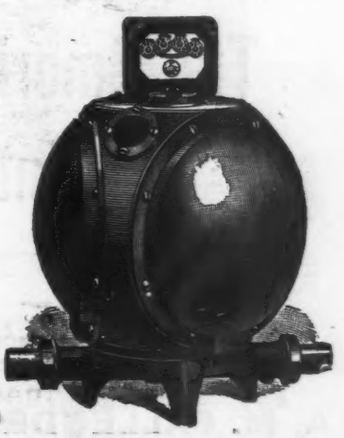

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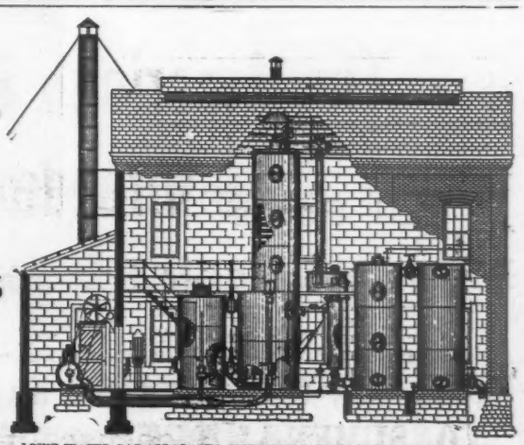

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